NASA TECHNICAL MEMORANDUM

NASA TM X- 72628
COPY NO.

NASA TM X-72628

(NASA-TM-X-72628) SCOUT LAUNCH VEHICLE,
PHASES 4 AND 5 Final Report (NASA) 861 p
HC $19.25
CSCL 22C

N75-14794

Unclas
G3/12 07703

SCOUT LAUNCH VEHICLE
FINAL REPORT – PHASES IV AND V

by Donald C. McCracken, Abraham Leiss,
Edith R. Horrocks and Nell H. Turpen
Langley Research Center
Hampton, Virginia 23665
November 1974

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER, HAMPTON, VIRGINIA 23665

1. Report No. TM X-72628	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle SCOUT LAUNCH VEHICLE PROGRAM FINAL REPORT PHASES IV AND V		5. Report Date 11/22/74
		6. Performing Organization Code 6600
7. Author(s) Donald C. McCracken, Abraham Leiss, Edith R.Horrocks and Nell H. Turpen		8. Performing Organization Report No.
9. Performing Organization Name and Address NASA Langley Research Center Hampton, VA 23665		10. Work Unit No.
		11. Contract or Grant No.
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546		13. Type of Report and Period Covered Hi Number TM X-Document 1965 thru 1971
		14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

The historical data of the Scout launch vehicle program for Phases IV and V (vehicles 138 through 177) is presented for the FY 1966 through FY 1971 time period. Technical data and accounting information are detailed to provide a total picture of this program. Phases I through III have been published previously (LWP-804) and Phases VI through completion will be published at a future date. This report completes the compilation of data through the Scout 77th launch.

17. Key Words (Suggested by Author(s)) (STAR category underlined) Scout Launch Vehicle Booster Systems Launch Vehicle Accounting System	18. Distribution Statement Unclassified - Unlimited

19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 882	22. Price* $19.25

*Available from { The National Technical Information Service, Springfield, Virginia 22151
STIF/NASA Scientific and Technical Information Facility, P.O. Box 33, College Park, MD 20740

TECHNICAL MEMORANDUM

SCOUT LAUNCH VEHICLE PROGRAM
FINAL REPORT - PHASES IV AND V

by Donald C. McCracken, Abraham Leiss, Edith R. Horrocks
and Nell H. Turpen

ABSTRACT

The historical data of the Scout launch vehicle program for Phases IV and V (vehicles 138 through 177) is presented for the FY 1966 through FY 1971 time period. Technical data and accounting information are detailed to provide a total picture of this program. Phases I through III have been published previously (LWP-804) and Phases VI through completion will be published at a future date. This report completes the compilation of data through the Scout 77th launch.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS CONTINUED

LIST OF ILLUSTRATIONS CONTINUED

LIST OF TABLES

LIST OF TABLES CONTINUED

LIST OF TABLES CONTINUED

LIST OF TABLES CONTINUED

LIST OF TABLES CONTINUED

LIST OF TABLES CONTINUED

GLOSSARY OF ABBREVIATIONS

AEC	Atomic Energy Commission
AEDC	Arnold Engineering Development Center (USAF)
AF	Air Force
AFSW	Air Force Systems Wing
ADIE	Air Density Injun Experiment
ANS	Astronomical Netherlands Satellite
APL	Applied Physics Laboratory
ASI	Apollo Standard Initiator
ATCE	Air Traffic Control Experiment
BES	Biological Experiment Satellite
BIO	Biological
BuWEPS	Bureau of Weapons (U.S. Navy)
CAS	Cooperative Application Satellite
CCN	Contract Change Notification
C/D	Command Destruct
CF	Construction of Facilities
C/O	Check Out
CRE	Communication Relay Experiment
DAD	Dual Air Density
DBASI	Double Bridge Apollo Standard Initiator
DCASO	Defense Contract Administration Service Organization
DOD	Department of Defense
EDSE	Electrical Ground Support Equipment
ERS	Earth Resoueces Satellite
ESRO	European Space Research Organisation
EW	Explorer Wedge
EXP	Explorer
FAT	Flight Acceptance Test
FR	French
GE	General Electric
GP	Gravity Probe
GRP	German Research Probe
GRS	Gernan Research Satellite
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
HCMM	Heat Capacity Mapping Mission
HI	Hercules Inc.
H_2O_2	Hydrogen Peroxide
HPC	Hercules Propulsion Corp.
HPTA	Hydrogen Peroxide Test Area
H/S	Heat Shield
ICE	Ice Crystal Effects
IGN	Ignition
IRP	Inertial Reference Package
JO	Job Order
LMT. RES.	Limit Resistor

GLOSSARY OF ABBREVIATIONS Continued

LRC	Langley Research Center
MG	Motor Generator
MGSE	Mechanical Ground Support Equipment
MIFE	Midcourse Inrwecept Feasibility Experiment
MIPR	Military Interdepartmental Purchase Request
MMC	Martin Marietta Corporation
MSO	Mission Support Office
MTS	Meteoroid Technology Satellite
NA	Navy
NDT	Nondestructive Test
NORD	Naval Ordnance Research Department
NOTS	Naval Ordnance Test Station China Lake, Calif.
NPE	Neutral Point Explorer
OAST	Office of Aeronautics and Space Technology
OFO	Orbiting Frog Otolith
OSS	Office of Space Science
OV	Orbiting Vehicle
PAET	Planetary Atmospheric Experiment Test
P/L	Payload
Q.C.	Quality Control
QASS	Quality Assurance Support Section at LRC
QUAL	Qualification
RAM	Radio Attenuation Measurements
RAS	LRC Job Order Designation
RE	Reentry
REIMB	Reimbursable
REMO	Resident Engineering and Management Office
RFD	Reentry Flight Demonstration Payload
R.F.I.	Radio Frequency Interference
RMS	Radiation Meteoroid Satellite
ROS	Radio Occultation Satellite
RTOP	Research and Technology Operating Plan
S	Scout
SAMSO	Space and Missile Systems Organization
S/A	Safe Arm
S.A.	Subauthorization
SAGE	Strategic Aerosol Gas Experiment
SAR	Search and Rescue Mission
SAS	Small Astronomy Satellite
SATS	Small Applications Technology Satellite
SBASI	Single Bridge Apollo Standard Initiator
SCS	Small Communications Satellite
SEAM	System Engineering and Management
SERT	Space Electric Rocket Test
SEV	System Evaluation Vehicle
SM	San Marco

GLOSSARY OF ABBREVIATIONS Concluded

SMTV	Shuttle Materials Test Vehicle
S/N	Serial Number
SNE	Solar Nevtron Experiment
SOP	Standard Operating Procedure
SPO	Scout Project Office
SSS	Small Standard Satellite
SPEAR	Scout Performance Evaluation and Ascent Reconstruction
S^3T	Scout Standard Systems Test
TCC	Thiokol Chemical Corporation
T/M	Telemetry
TOLIP	Trajectory Optimization and Linearized Pitch Computer Program
TRW	Thompson RAMO Woolridge
UK	United Kingdom
USNAD	United States Navy Ammunition Depot
UTC	United Technology Corporation
VAFB	Vandenberg Air Force Base
WI	Wallops Island
WS	Wallops Station
WTR	Western Test Range
RAE	X-Ray Astronomy Experiment

SUMMARY

The standard Scout launch vehicle is a solid propellant, four-stage booster system approximately 73 feet in length with a launch weight of 40,000 pounds and a lift-off thrust of 100,000 pounds designated as Scout-B. When the Algol III was used for its maiden launch, the launch weight of Scout increased to 47,500 pounds and the lift-off thrust increased to 130,000 pounds and the vehicle was designated Scout-D.

Since the first Scout launch in July of 1960 the Scout launch vehicle has demonstrated an increasingly important role as a highly reliable, cost effective vehicle within the national booster inventory. The Scout has exceeded the 90 percent success ratio that it designated as its goal at the start of the program. The Scout has launched payloads for many United States agencies and for various international space organizations. These missions include orbital, probe, and reentry trajectories and encompass inclined, equatorial, and polar orbits. The prime contractor is the Vought Missiles and Space Company of LTV Aerospace Corporation.

Throughout the period covered by phases IV and V, the Scout vehicle and associated systems and operational procedures have been systematically updated to significantly improve both reliability and performance.

The historical data (technical and financial) of a continuing program, if properly organized, can be used effectively for future planning programs. The Scout program has been documented since its inception and takes pride in both its technical success and financial achievements. The Scout vehicles (S-138 through S-177) of phases IV and V as well as the period covering FY 1966 through FY 1971 are documented in a manner that presents complete information of the Scout Program. It is the intention of the authors to present the history of all technical systems and administration of the Scout Program during this period.

The cost of Scout has been kept much lower than any other research launch vehicle. Phase IV hardware costs averaged only $1.180 million each and Phase V only $1.190 million each. Since the Scout was started in 1959, at hardware costs of about $1 million each, the increase to $1.190 million in 12 years (through 1971) is a significant accomplishment of the Scout Project Office and the Langley Research Center. The costs were controlled by tracking all Scout financial data to every expenditure regardless of how minute, as is illustrated in this document.

At the time of this publication Phase VI has been continuing and publication of that final report would be expected in the FY 1977 time period.

SCOUT LAUNCH VEHICLE PROGRAM
FINAL REPORT - PHASES IV AND V

by Donald C. McCracken, Abraham Leiss, Edith R. Horrocks
and Nell H. Turpen

Langley Research Center

INTRODUCTION

The Scout Launch Vehicle Program is categorized as follows:

Phase I - Development of the Scout Vehicle(1)
Phase II - Prototype of Production Scouts(1)
Phase III - Scout Recertification Program(1)
Phase IV - Systems Management of Scout(2)
Phase V - Incentive Procurement(2)
Phase VI - Award Fee Procurement
Phase VII - Continuing Program

This document will include all aspects of Phases IV and V, and will be considered the final report on these phases. The time periods covered are as follows:

Phase IV - November 1965 through June 1971
Phase V - April 1968 through December 1971(3)

The Scout Project Approval Document states the following objectives: (a) to procure Scout launch vehicles, including launch services, for the accomplishment of NASA missions in Space Science, Applications and in Space Technology; in addition, to procure Scout launch vehicles and services on a reimbursable basis for other authorized users; (b) to provide engineering services for production vehicles, for corrective changes or improvements in systems and procedures as required to maintain the operational capabilities of the Scout launch vehicle system; and (c) to provide for major product and performance improvements as may be required and approved in support of Scout's role in the national launch vehicle family.

The Goal and Mission of the Scout Project Office are as follows:

---

(1) All aspects of Phases I, II, and III are covered in a final report submitted in Langley Working Paper 804 dated 11/20/69.

(2) Detailed in this report.

(3) The 15th vehicle of Phase V (170) was processed in this time period but not launched until October 1972 from the San Marco Range.

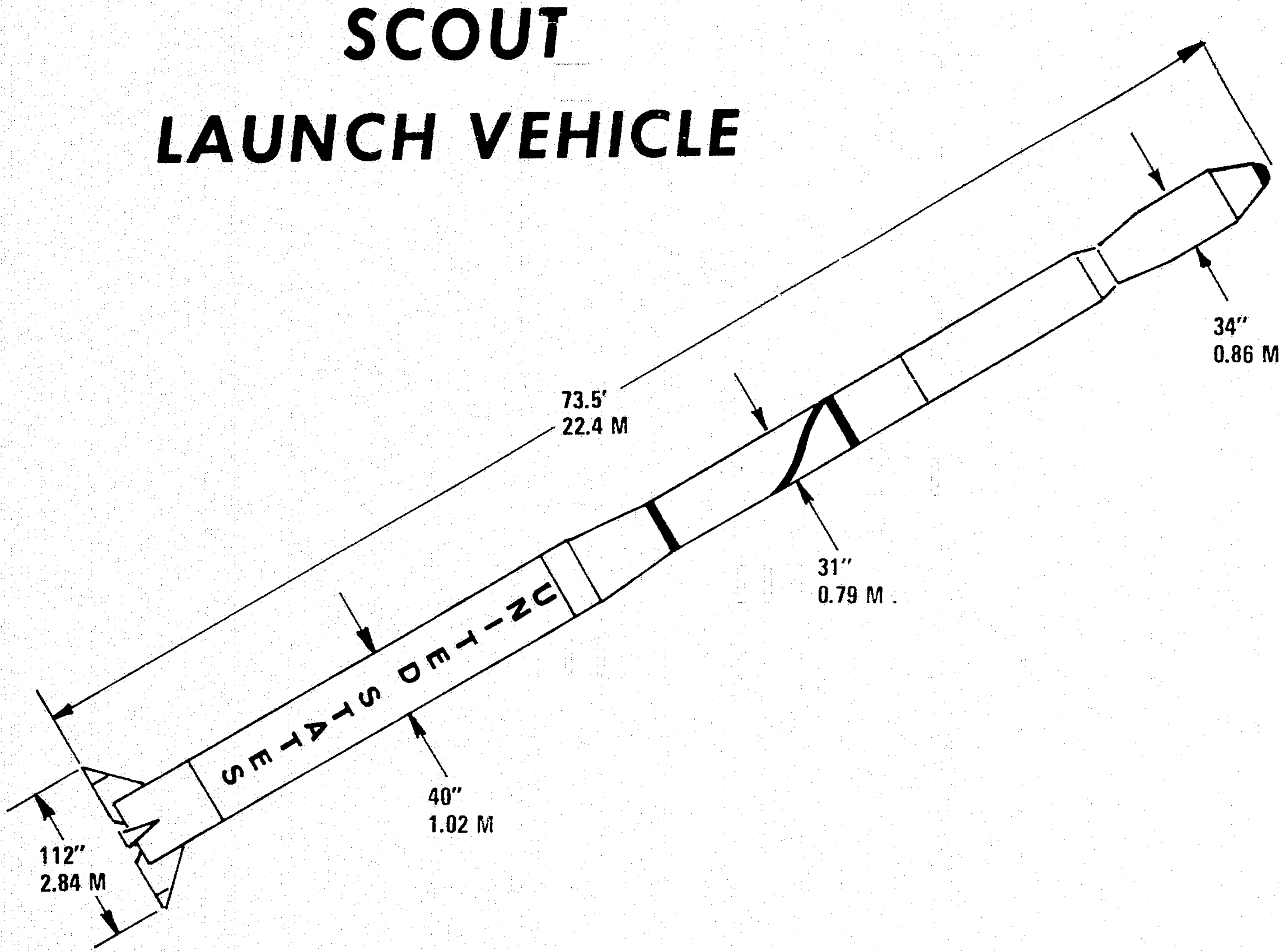


Figure 1.- Scout-B Launch Vehicle.

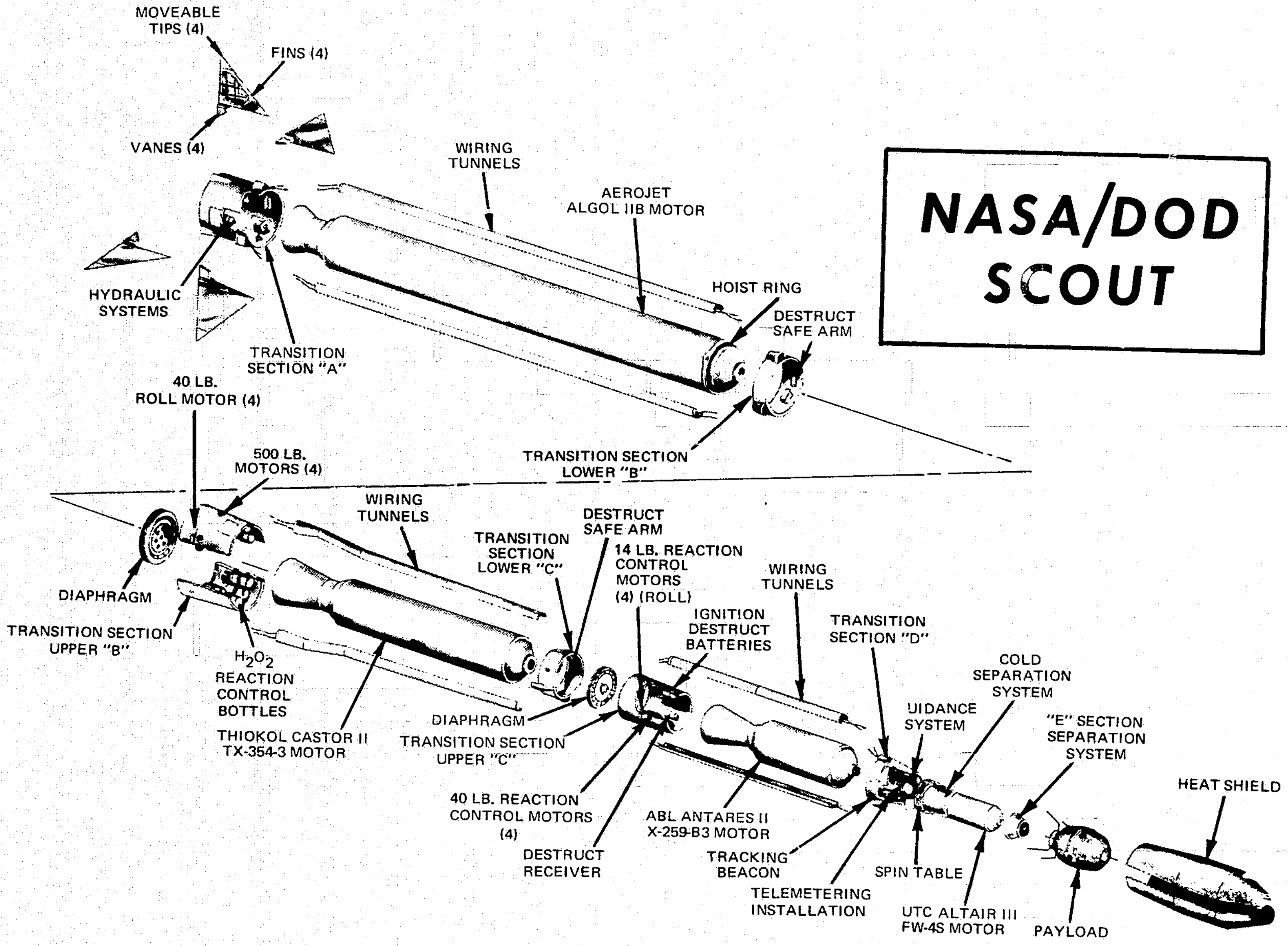


Figure 2.- Scout vehicle systems and structures.

(a) Reliability. To achieve and maintain a success ratio of 90 percent or greater.

(b) Launch. To coordinate and launch approved missions for various payload agencies.

(c) Major Product Improvement. Product improvement of the Scout vehicle has been primarily aimed at increasing the overall vehicle reliability, and at improving vehicle performance by incorporating selective changes compatible with the basic Scout design. Performance improvements have been achieved by incorporating improved motors for all four stages of the Scout, with a performance gain to date of approximately 220 percent.

The Scout vehicle is a four-stage guided research booster utilizing solid propellant rocket motors capable of boosting payloads of varying sizes in orbital, reentry, and probe missions. Figure 1 shows a sketch of a typical Scout vehicle. Figure 2 illustrates the major systems and parts of Scout-B. Although Scout-D was developed in this time period, it was a Phase VI and VII Program. Even though one was launched in Phase V total information will be presented in the future Phase VII report. A photograph of one of the few Scout night launches (vehicle 169) is shown in figure 3.

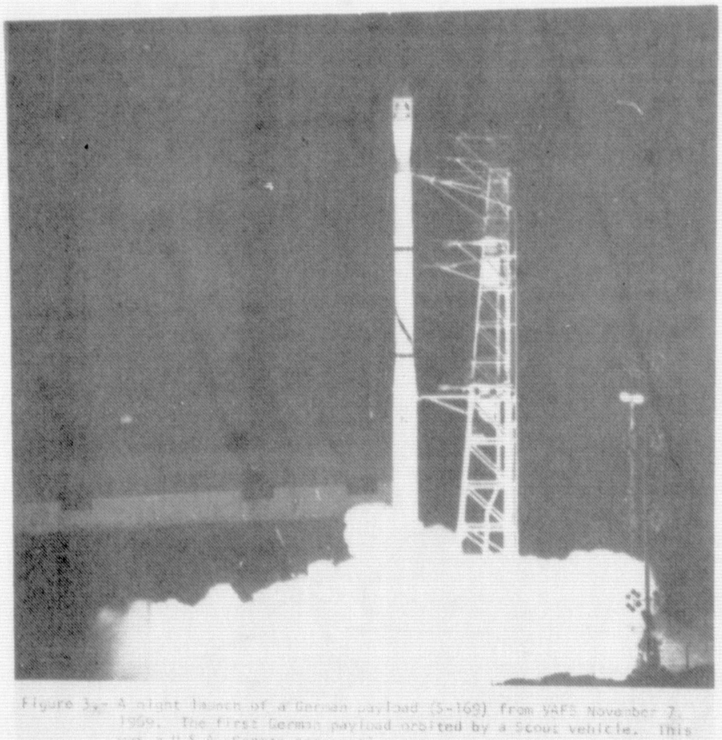


Figure 3.- A night launch of a German payload (S-169) from VAFB November 7, 1969. The first German payload orbited by a Scout vehicle. This was a U.S.A.-German cooperative program.

For all trajectories, the first-stage motor remains attached to the vehicle after burnout and the vehicle coasts to an altitude that results in a nominal q of approximately 40 pounds per square foot for first-stage separation. The maximum q is 2,200 pounds per square foot which occurs during first-stage burning and is reached at about 36,000 feet altitude. The majority of Scout launch requirements have been aimed at achieving near-earth orbits. Figure 4 illustrates a profile in a typical Scout mission. Because of the strong emphasis in the past and in the foreseeable future on orbit missions, the bulk of the performance data presented will deal with this aspect of Scout capability. Each type of trajectory has requirements itemized as follows:

(a) Orbital. For orbit missions the Scout vehicle utilizes the first three stages to boost the fourth stage plus payload to the desired injection altitude. The fourth stage is then used as the injection stage by accelerating the payload to the desired orbital velocity. The injection altitude is controlled by a predetermined pitch-rate program which commands the guidance and control system to steer the vehicle along the desired trajectory. Figure 5 illustrates the Scout boost trajectory pitch program orbit mission. Orbit inclination is determined by the latitude and vehicle heading angle at injection. These parameters are controlled, for a given mission, by the launch azimuth and any heading angle change obtained by yaw torquing.

Figure 6 illustrates a typical Scout orbital mission boost trajectory. The second stage is not ignited until the dynamic pressure reduces to the level which insures second-stage control system capture. A short coast phase following first-stage burnout is sometimes necessary to obtain the proper conditions for second-stage ignition. When the second stage is ignited, simultaneous separation from the first stage occurs.

A nominal coast period of 5 seconds follows second-stage burnout during which the payload heat shield is ejected. Third-stage ignition and second-stage separation then occur simultaneously. During the first three boost phases the vehicle pitch-rate program is designed to command the vehicle to fly a zero-lift (gravity turn) trajectory. Following third-stage burnout the control system orients the vehicle to the proper injection attitude. Following a long third-stage coast phase (200 to 600 seconds, depending upon the mission) the payload plus fourth stage is then ignited and accomplishes the necessary injection into orbit. The payload may or may not be separated from the empty fourth stage following burnout. Table I lists the sequence of events of a typical launch.

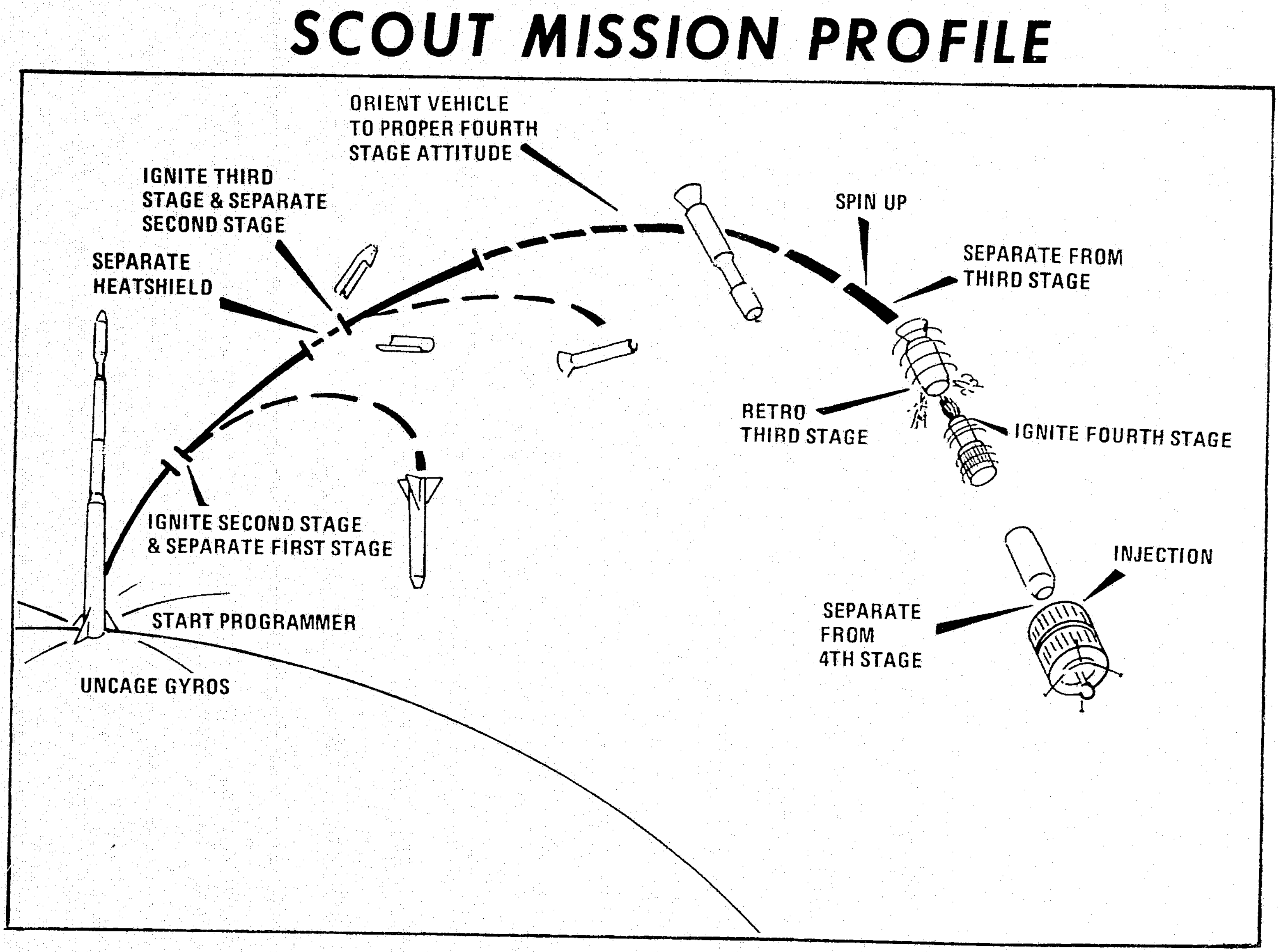


Figure 4.- Scout mission profile.

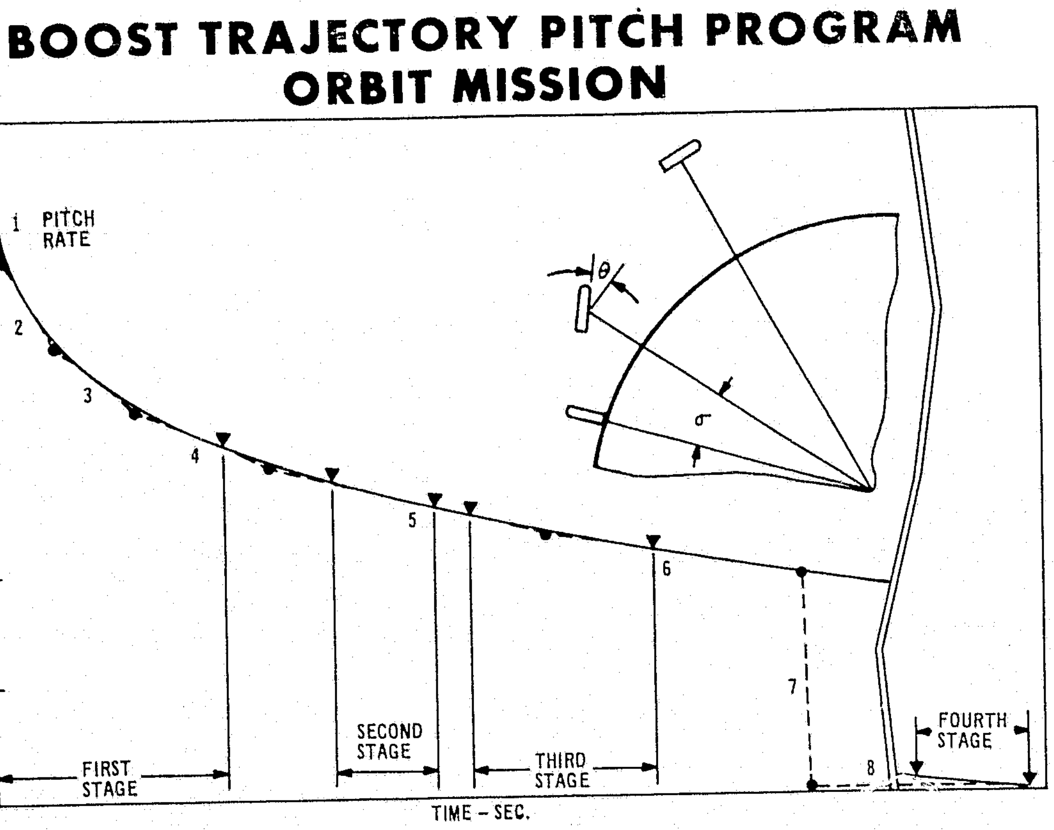


Figure 5.- Scout boost trajectory pitch program orbit mission.

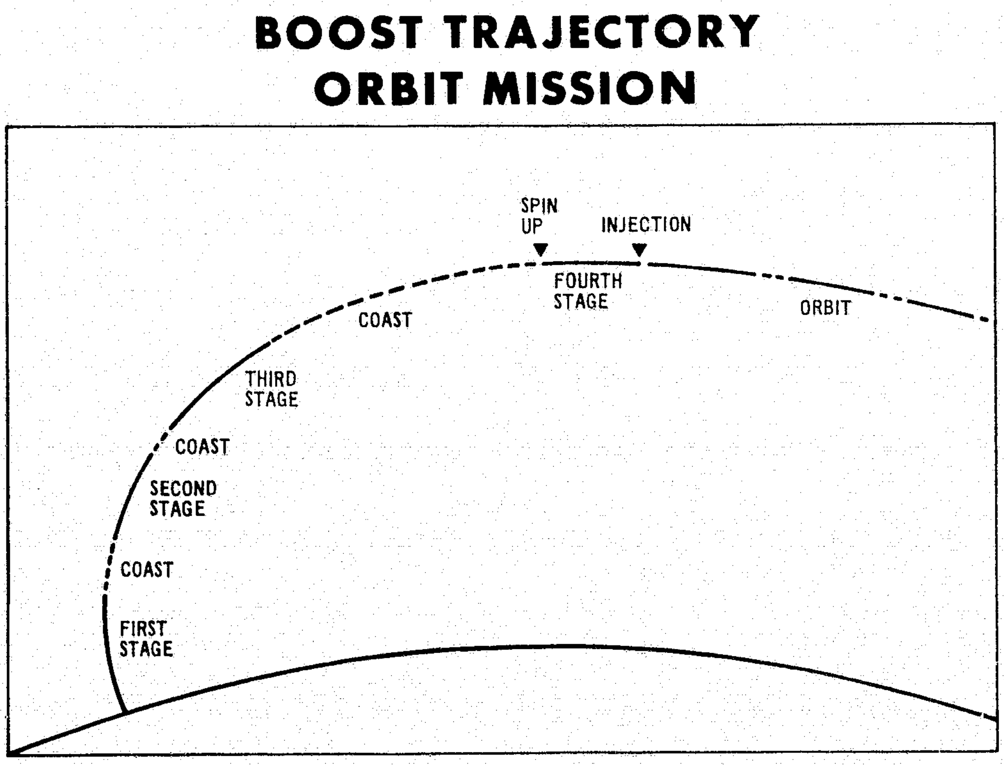


Figure 6.- Typical Scout orbital mission boost trajectory.

TABLE I - SEQUENCE OF EVENTS AND GUIDANCE PROGRAM

TIME (SEC.)	EVENT	TIME (SEC.)	EVENT
0.00	LIFT-OFF	122.22	STG. 3 IGNITION
0.03*	START TIMER		SEPARATE STG. 2
	(6) PITCH RATES	157.72	STG. 3 BURNOUT
76.57	STG. 1 BURNOUT		(2) PITCH RATES
78.32	STG. 2 IGNITION	162.72	ACTIVATE CONTROLS
	ACTIVATE "B"	713.52	SPIN & SQUIB IGN.
	SEPARATE STG. 1		
	(2) PITCH RATES	715.02	SEPARATE STG. 3
117.22	STG. 2 BURNOUT	716.02	RETRO
120.52	SEPARATE H/S	719.52	STG. 4 IGNITION
	ACTIVATE "C"	742.72	STG. 4 BURNOUT

* PREDICTED LIFT-OFF OCCURS 0.08 SECONDS AFTER IGNITION

Figure 7 shows the first Phase IV Scout (138) being prepared for an orbital launch. Figures 8, 9, and 10 designate the orbital performance of the Scout-B vehicle.

(b) Probe. A Scout probe mission is achieved by imparting the maximum energy of the booster system to the payload, allowing the payload to ascend to a maximum height. Figure 11 illustrates a typical probe ascent trajectory. The only major difference between probe and orbit missions is in the timing of fourth-stage firing. In a probe mission, the fourth stage is fired nominally 20 seconds following third-stage burnout. Fourth-stage spinup and separation are accomplished during this coast phase. The payload may or may not be separated from the empty fourth stage following burnout.

The probe mission performance data presented in figure 12 are for Wallops Station launches on an azimuth of 109 degrees. The 109-degree azimuth was selected because (for the normal range of payload weights) all stages will impact in the ocean. Although this launch azimuth falls inside the launch corridor excluded for orbit missions because of Bermuda range safety considerations,

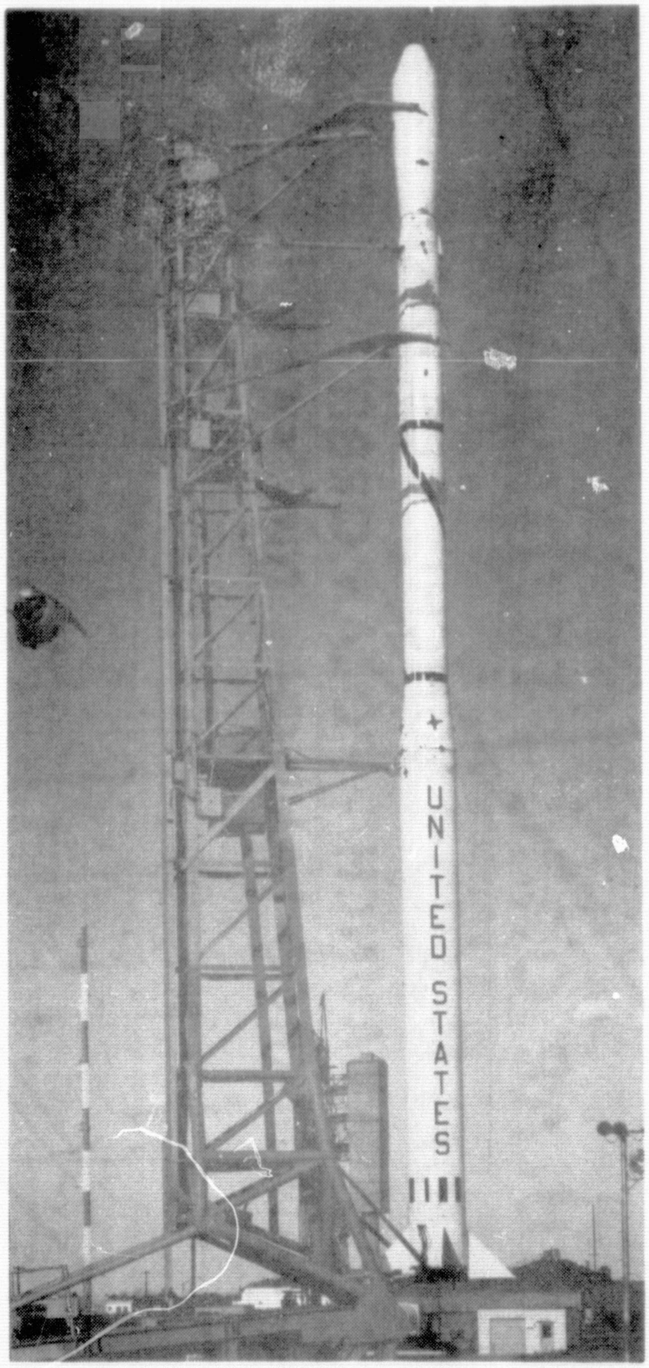


Figure 7.- First Phase IV Scout (S-138) ready to launch Explorer XXX from Wallops Island (Nov. 1965).

CIRCULAR ORBIT PERFORMANCE

WALLOPS ISLAND LAUNCH - DUE EAST
VAFB LAUNCH - POLAR ORBIT
SAN MARCO LAUNCH - DUE EAST

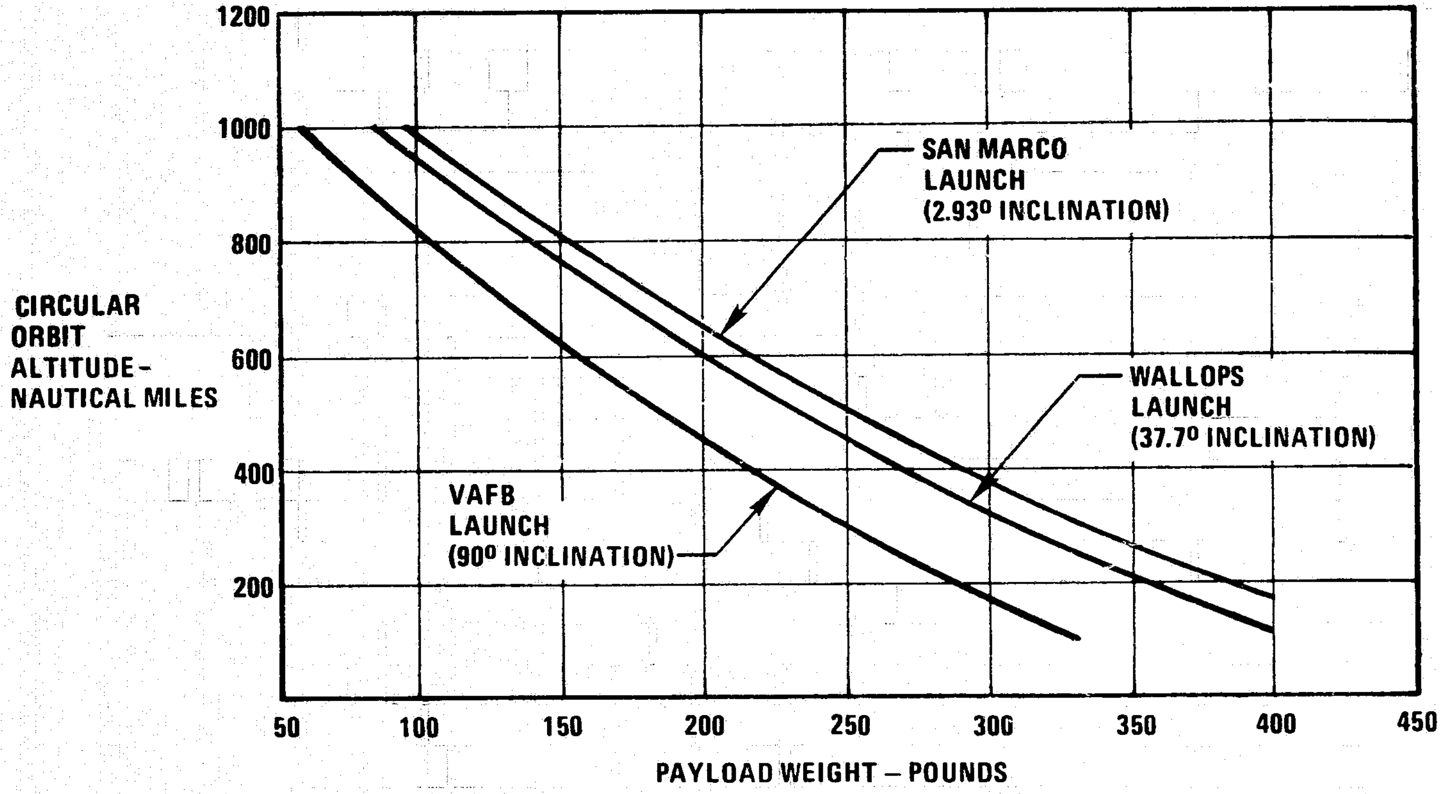


Figure 8.- Scout-B circular orbit performance.

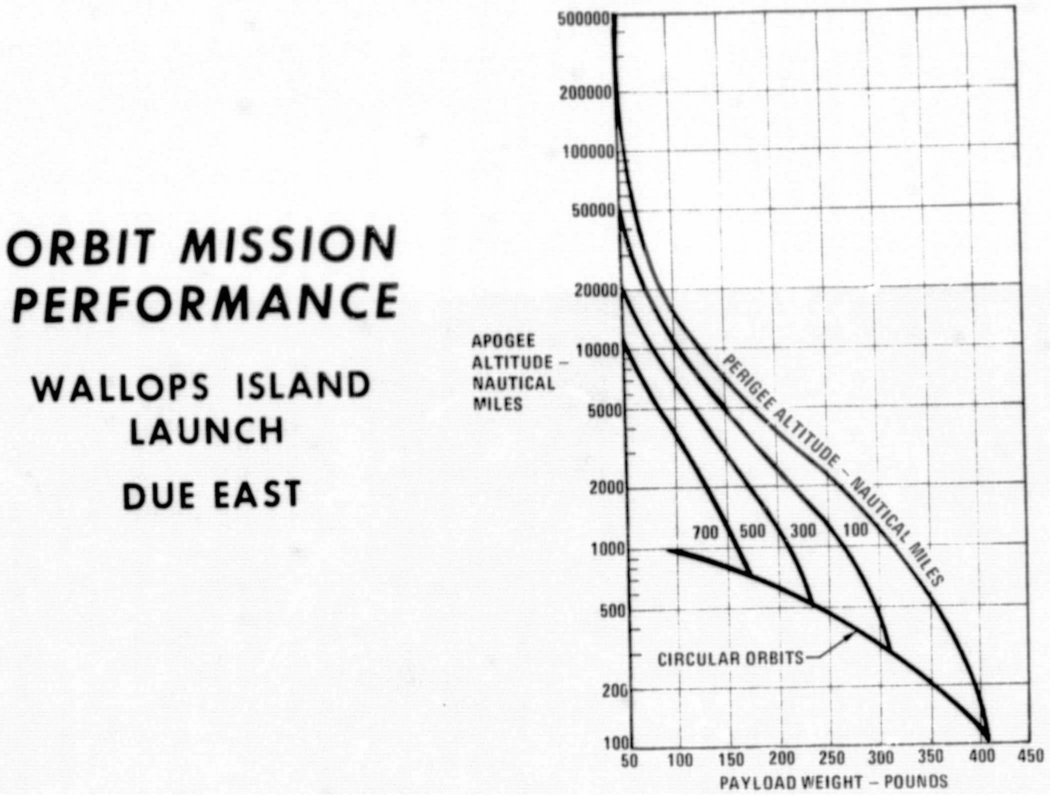


Figure 9.- Scout-B easterly orbit capability.

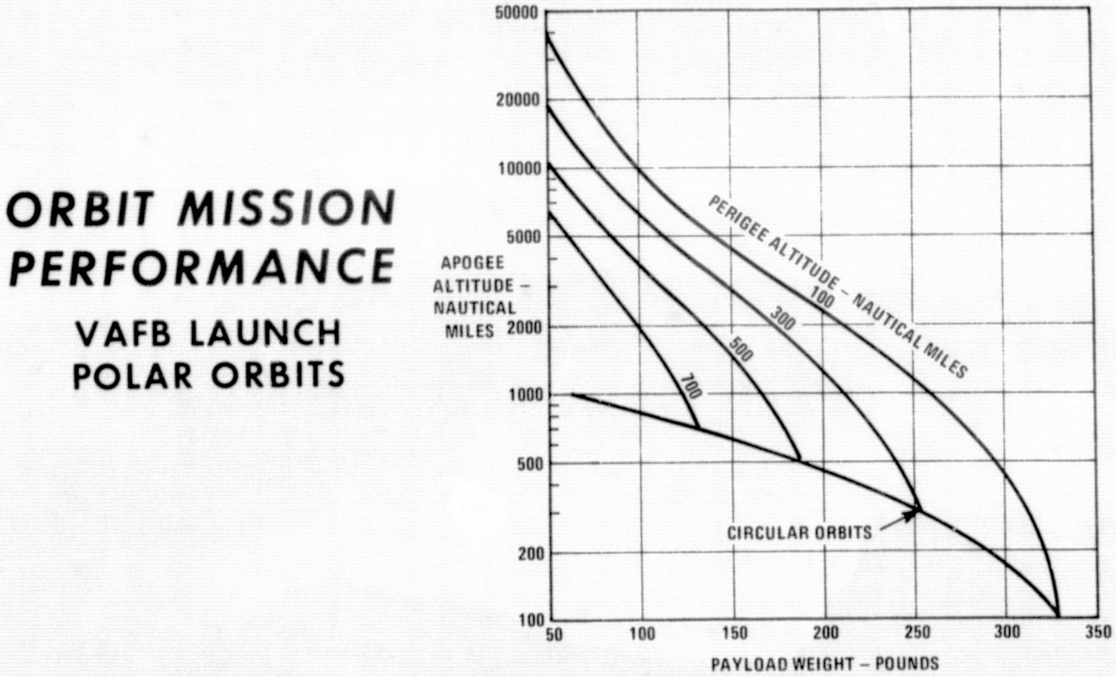


Figure 10.- Scout-B polar orbit capability.

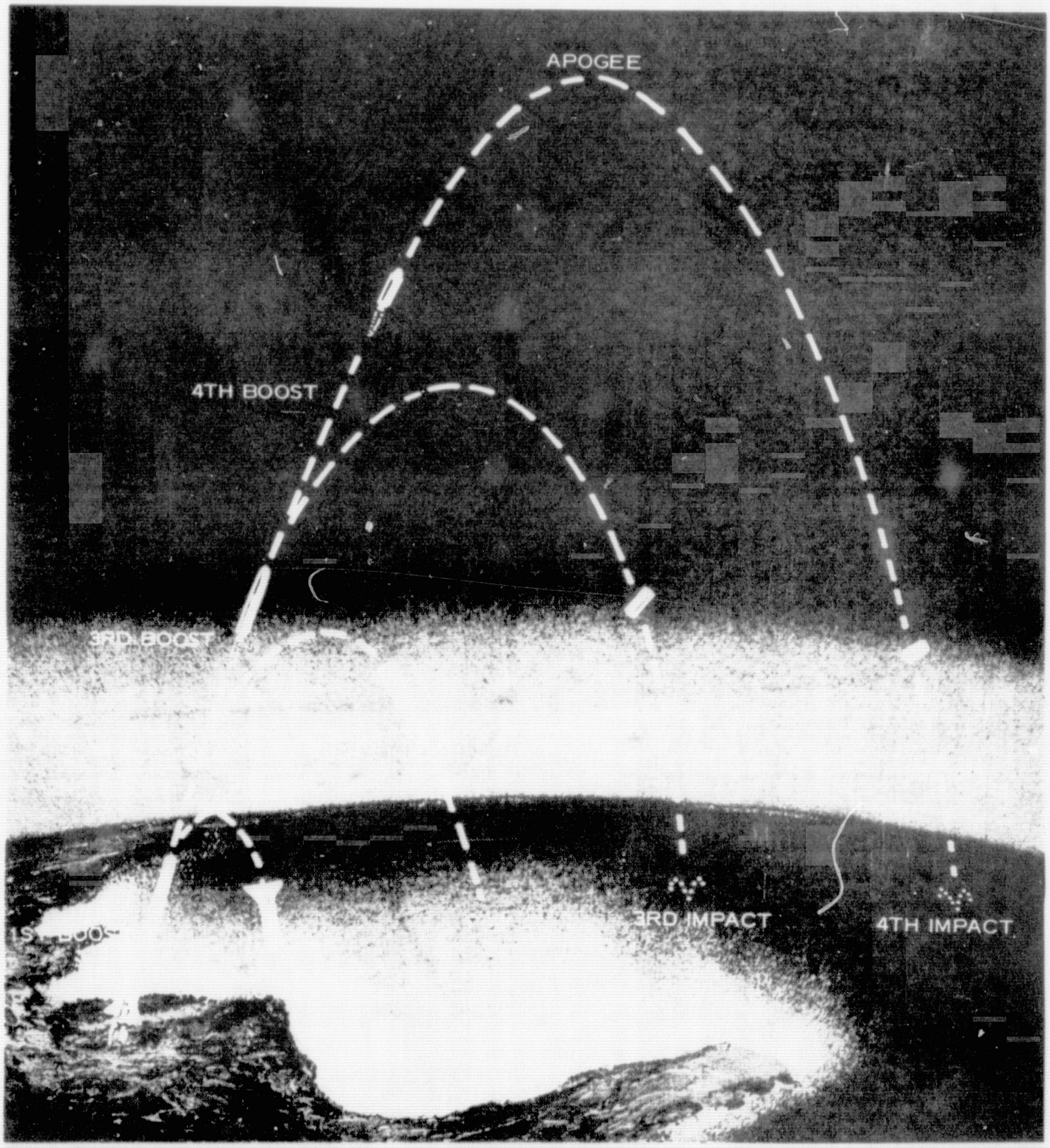


Figure 11.- Typical Probe boost ascent and payload trajectory.

PROBE MISSION PERFORMANCE

WALLOPS ISLAND
LAUNCH
109° AZIMUTH

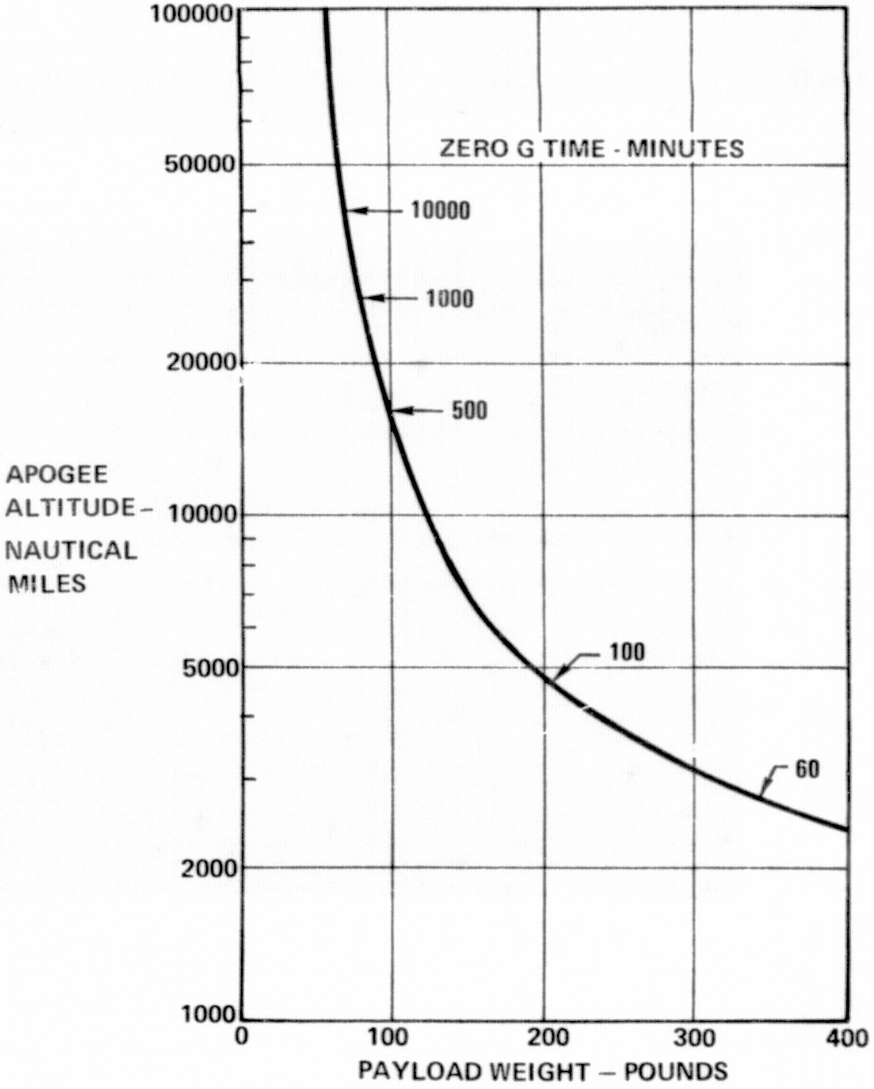


Figure 12.- Scout-B probe mission performance at 109° azimuth.

the higher flight-path angle of steep probe trajectories generally decreases the second-stage impact range and assures that this stage will impact outside the limit area around Bermuda.

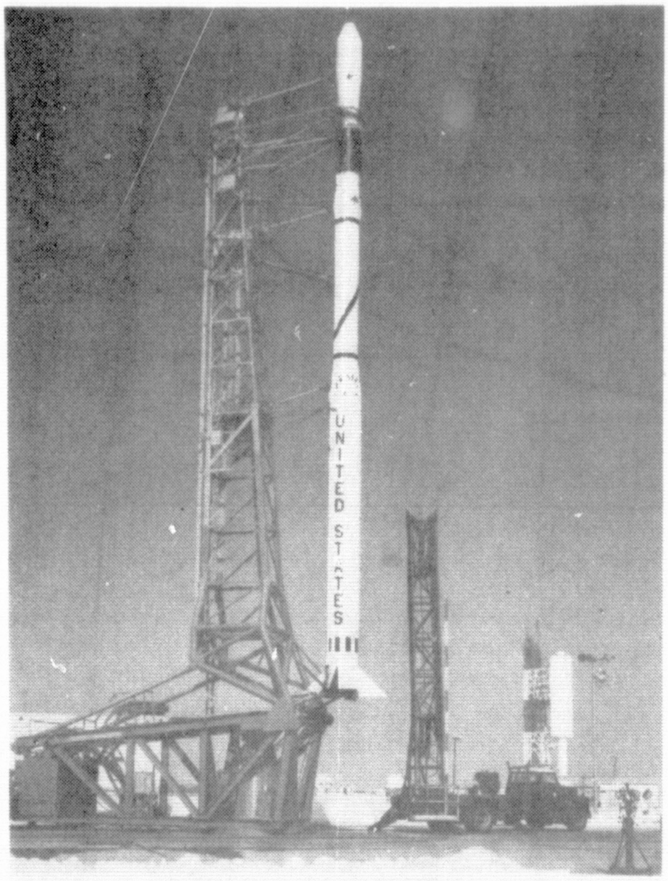


Figure 13.- Vehicle S-141C was the first Scout Reentry Launch under Phase IV.

(c) Reentry. The Scout vehicle lends itself well to the reentry-type mission. When employed to fly a reentry mission trajectory a significant departure from orbit and probe mission staging sequence is required. The first two stages are handled in the same manner as orbit and probe missions. However, the third and fourth stages are generally used to drive the payload back into the atmosphere. This necessitates a much longer second-stage coast than the normal 5 seconds used for orbit and probe missions. This long coast phase allows the vehicle to coast to the vicinity of the apogee altitude resulting from the energy supplied to the system by stages one and two. The exact ignition time and position of the third stage is determined by the reentry test conditions required by the payload agency. Following third-stage burnout a minimum coast phase of 20 seconds is required to perform the spinup and separation of the fourth stage and payload. The first Scout reentry launch under Phase IV is shown in figure 13.

A typical reentry mission profile is illustrated in figure 14. Figure 15 illustrates the Scout-B reentry performance data for a 129-degree azimuth launch.

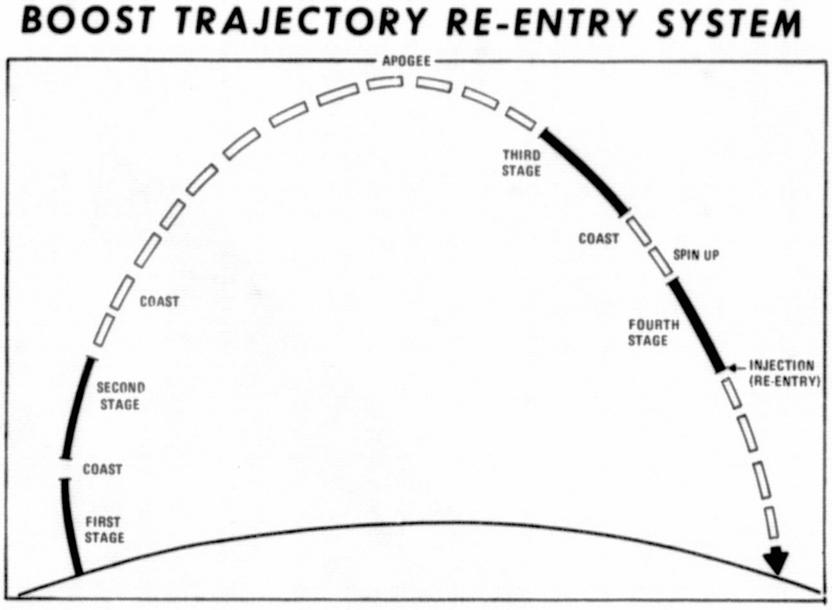


Figure 14.- Scout-B typical reentry mission profile.

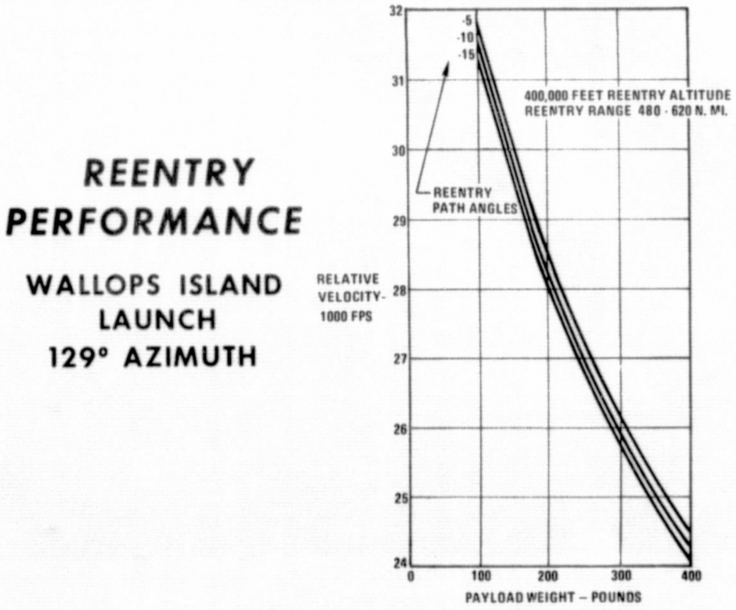


Figure 15.- Scout-B reentry performance for a 129° azimuth launch.

The only X5C Scout launched was S-164. The Reentry-F payload was launched April 27, 1968, from Wallops Island without a Scout heat shield on top of S-164. This was the first Phase V vehicle from Wallops Island. Figure 16 shows S-164 being raised into launch azimuth.

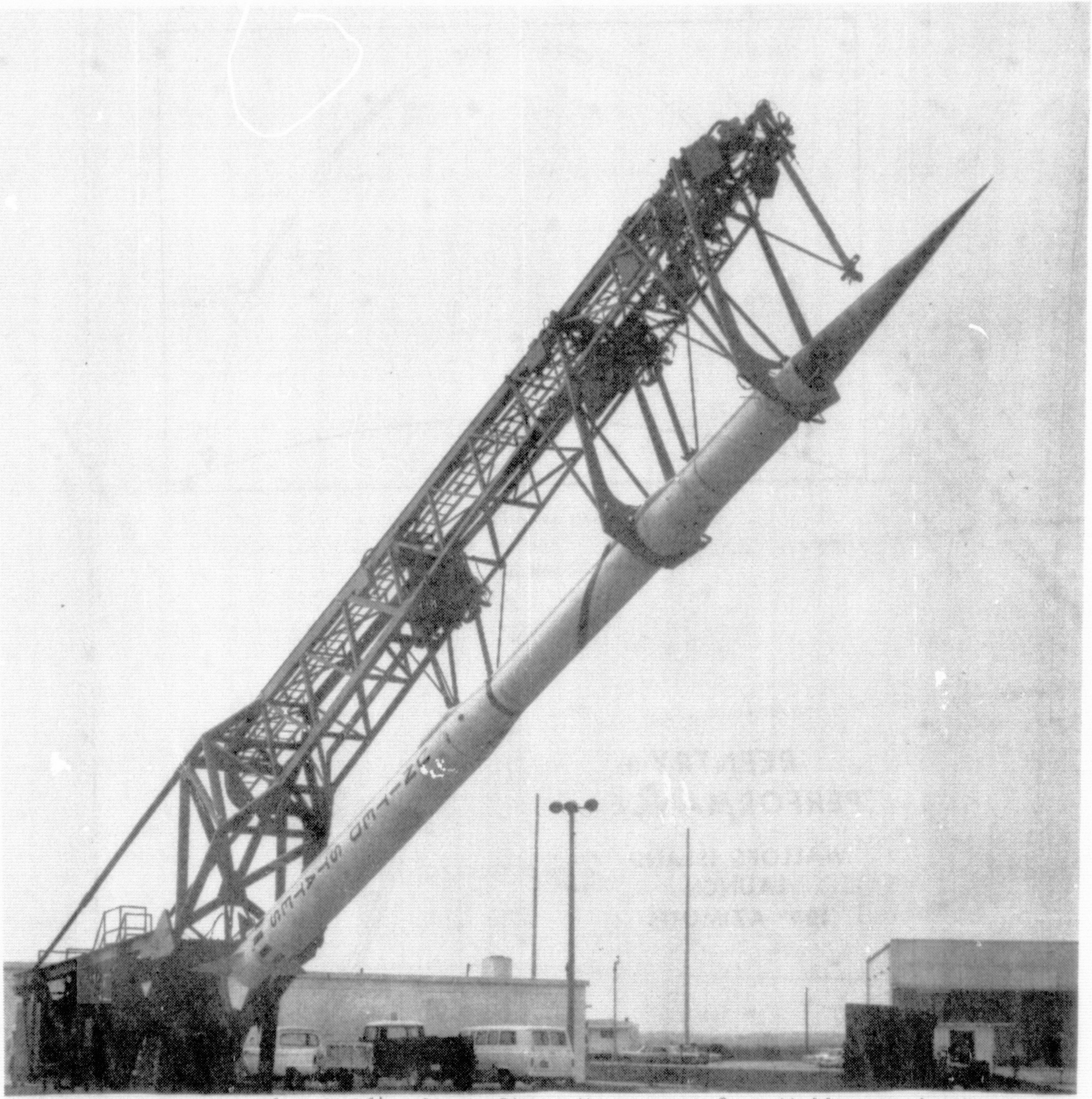


Figure 16.- S-164, first Phase V reentry from Wallops Island being readied for launch.

Scout vehicles are launched from three geographical areas as shown in figure 17.

SCOUT
AGENCY AND LAUNCH SITE LOCATIONS

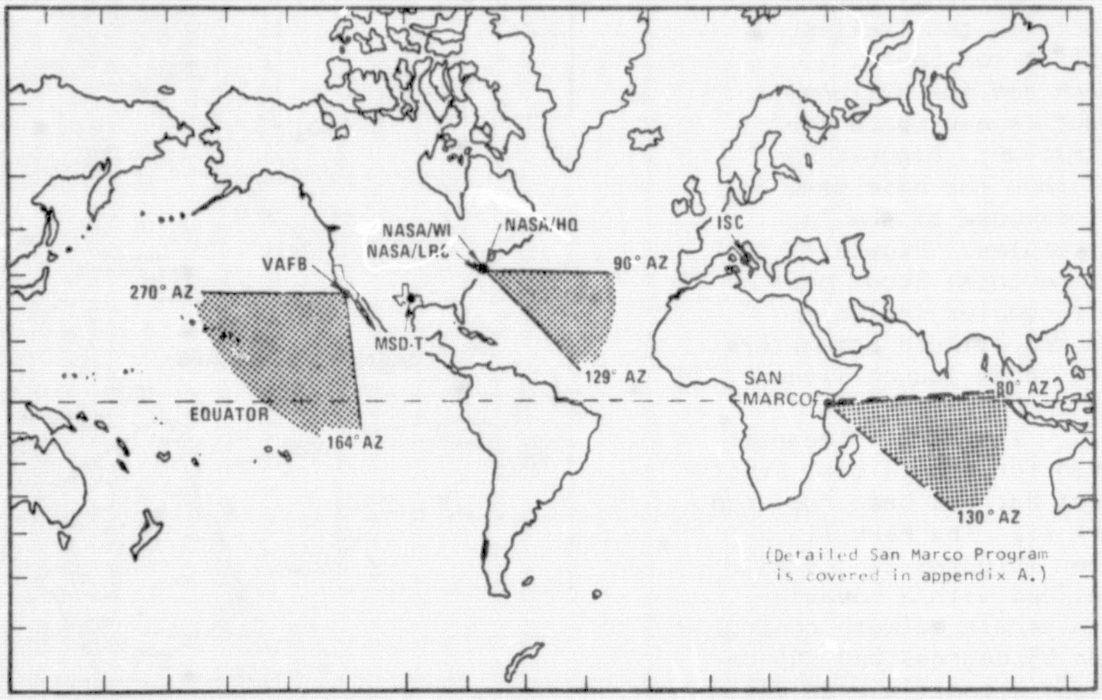


Figure 17.- Total Scout geographical complex.

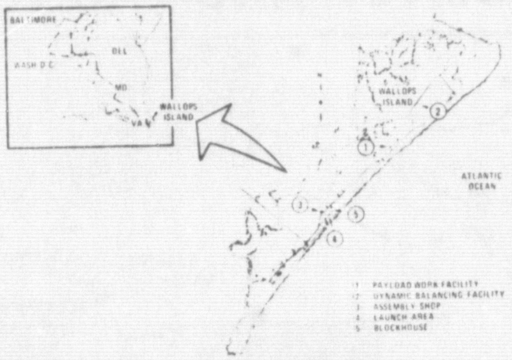
The easterly launch site is Wallops Island as mapped in figure 18(a). The Vandenberg Air Force Base site as shown in figure 18(b) is for polar orbits. Figure 18(c) shows the African launch site (Italian government-owned) which is used for equatorial orbits. Figure 19 shows S-153 being prepared for launch at the San Marco Range. The Italian engineers for the San Marco-B spacecraft are checking the spacecraft before launching. The spacecraft was launched from a platform at sea off the coast of Kenya, Africa, at 5:06 a.m., EST, April 26, 1967. Tracking data from NASA's Space Tracking Data Acquisition (STADAN) stations in Quito, Equador, and Lima, Peru, indicate that the spacecraft is in the prescribed equatorial orbit with an apogee and perigee close to nominal. The satellite, first ever to be launched from a platform at sea, was designed to obtain continuous equatorial air density measurements. The Italian Commission for

Space Research (CRA) designed and built the 285-pound spacecraft. The entire launch complex was also a responsibility of the CRA. The project was carried out under a cooperative international agreement between the Italian Commission for Space Research and the National Aeronautics and Space Administration. Figures 20 and 21 show the base camp and blockhouse of the San Marco complex. Figure 17 shows the total Scout geographic complex including the launch azimuth parameters for the three launch sites.

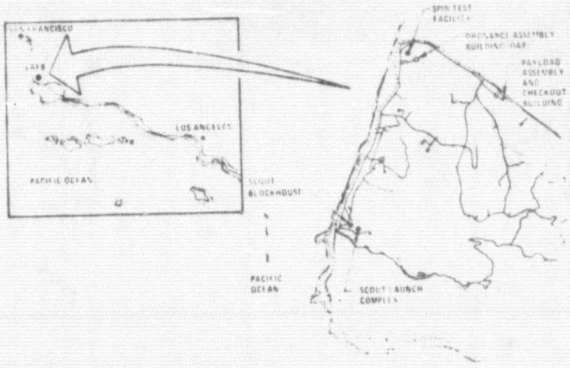
The Mark I launcher was used for the initial Scout launches but has been replaced by Mark II. The Mark II launcher (figures 22 and 23) is provided with a movable base to permit azimuth control between 65 degrees and 205 degrees and a cantilevered elevating launch boom to permit pitch control to the 90-degree position required for launch. The launcher with the Scout vehicle in position permits checkout of the vehicle in the horizontal position.

An electromechanical system is provided for erecting the vehicle to the vertical attitude. Erection acceleration is limited so that critical loads will not be imposed on the Scout vehicle and mission.

(a) WALLOPS ISLAND



(b) VANDENBERG AFB



(c) SAN MARCO

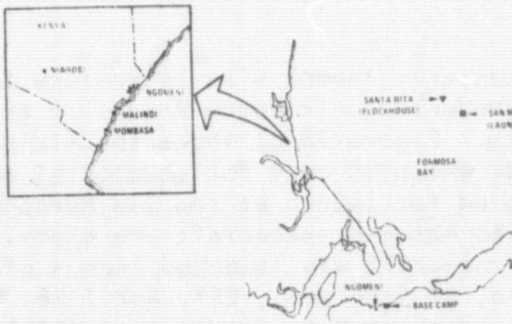


Figure 18.- Scout launch sites.

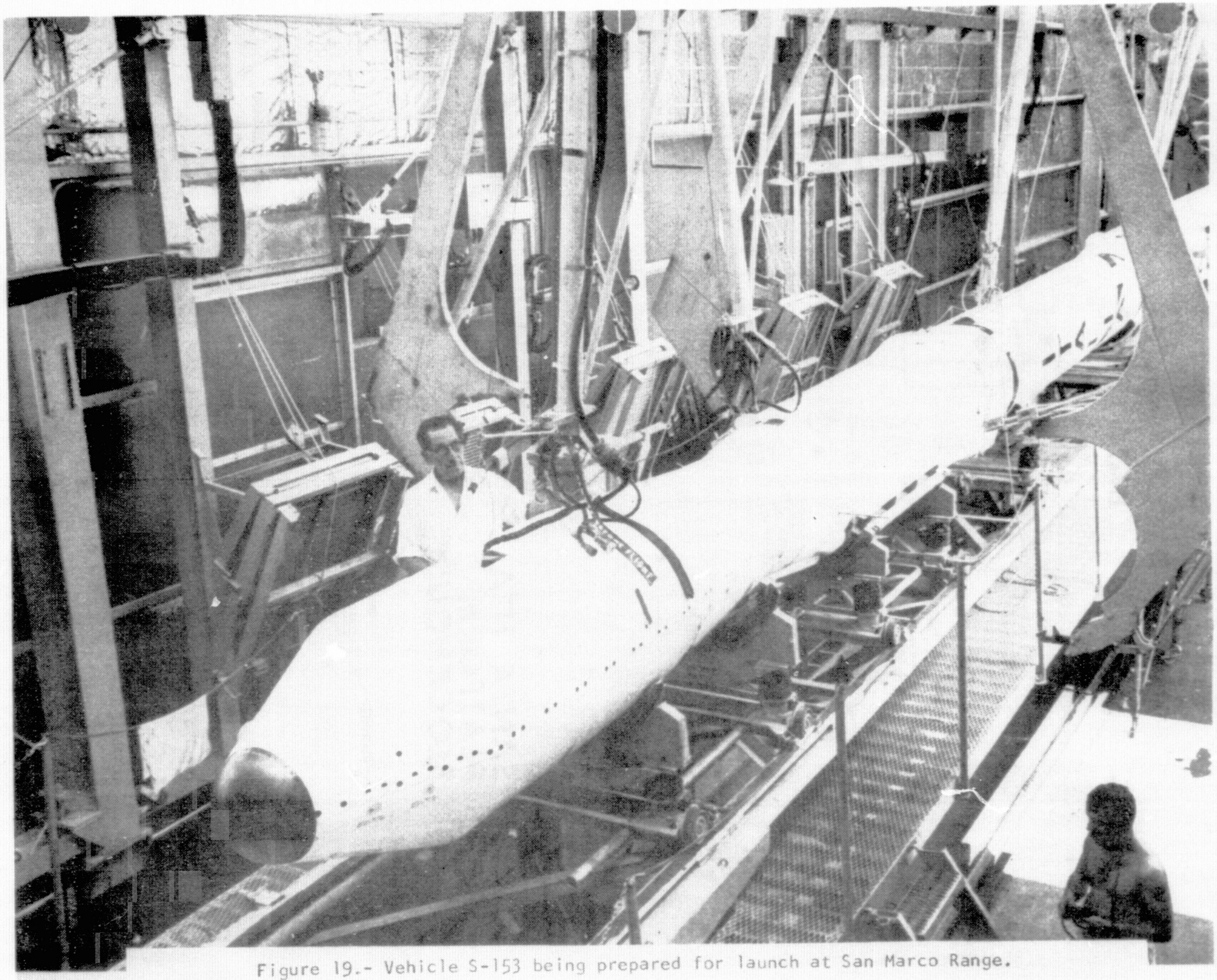


Figure 19.- Vehicle S-153 being prepared for launch at San Marco Range.

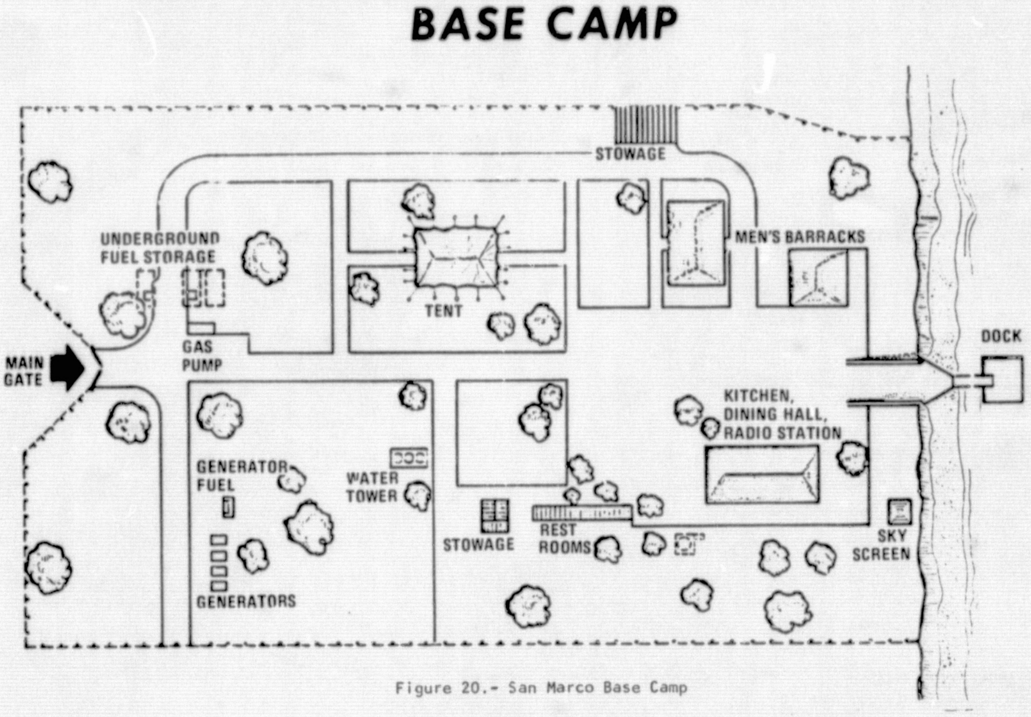


Figure 20.- San Marco Base Camp

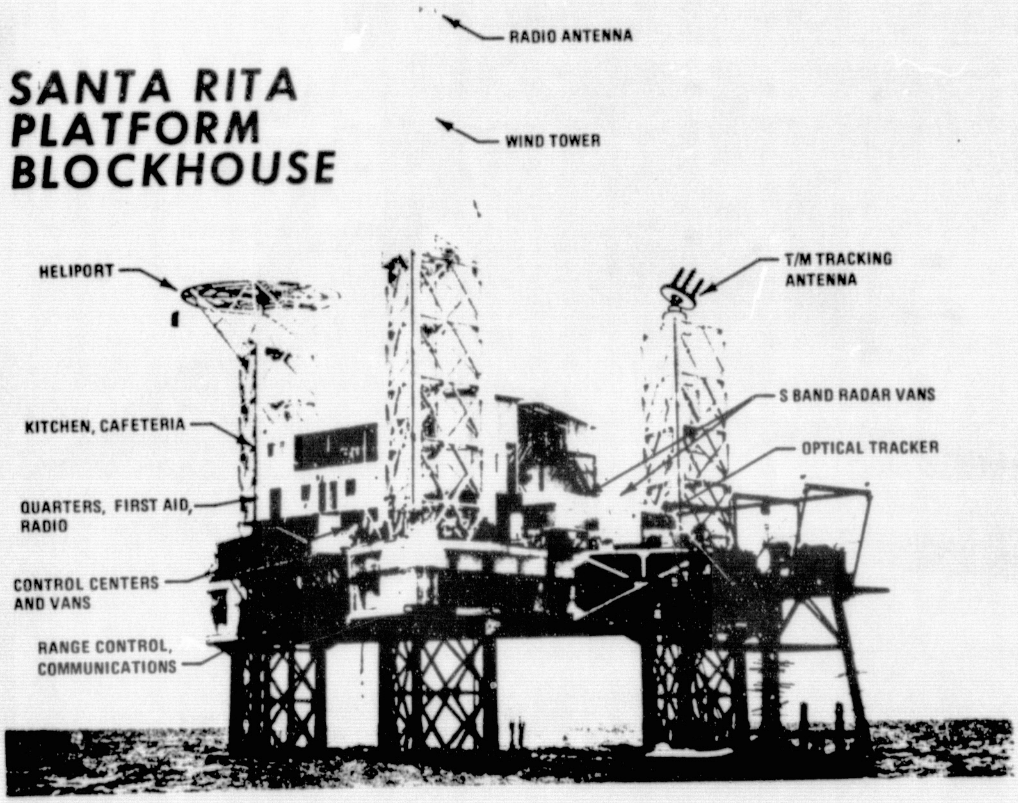


Figure 21.- Equatorial launch complex showing platform blockhouse.

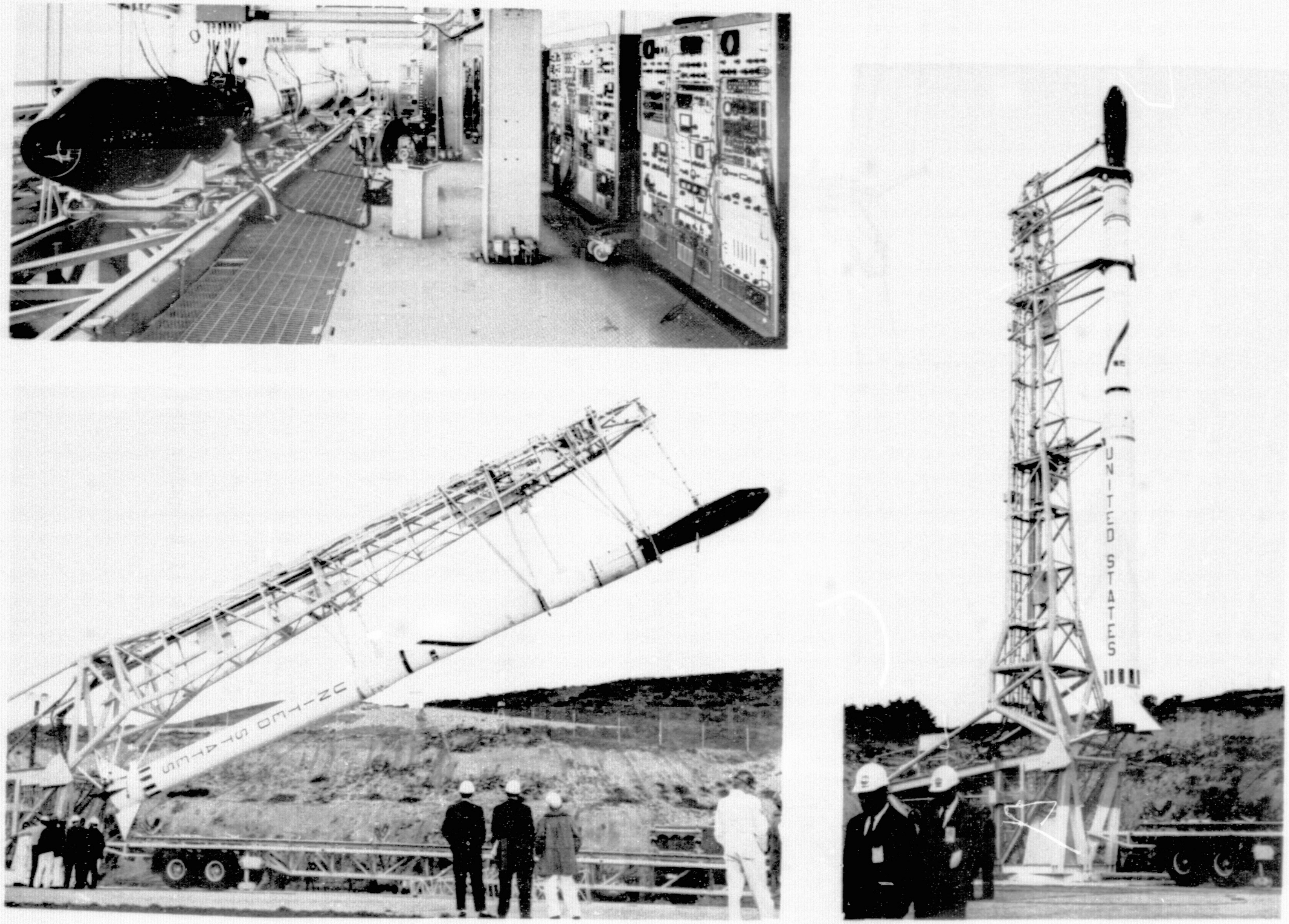
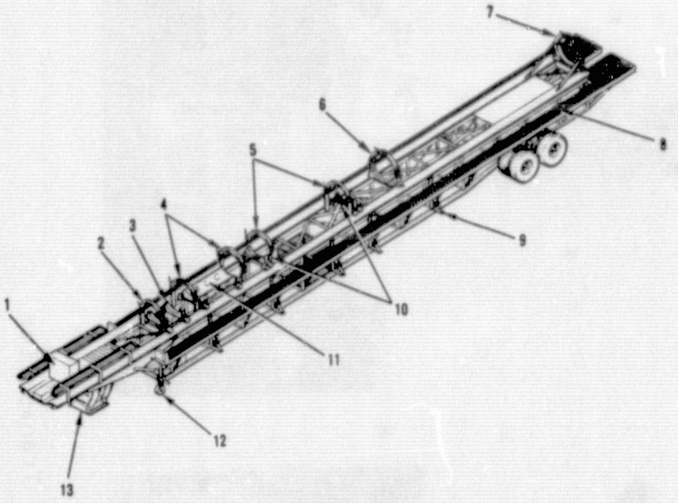
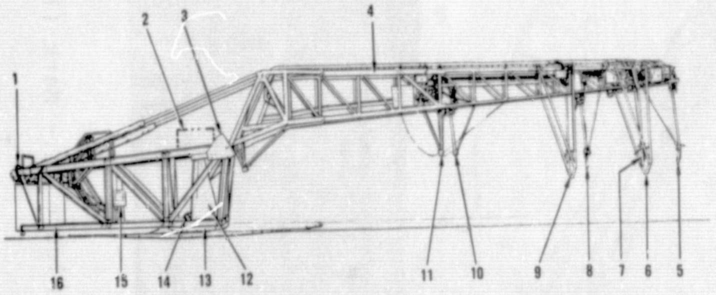


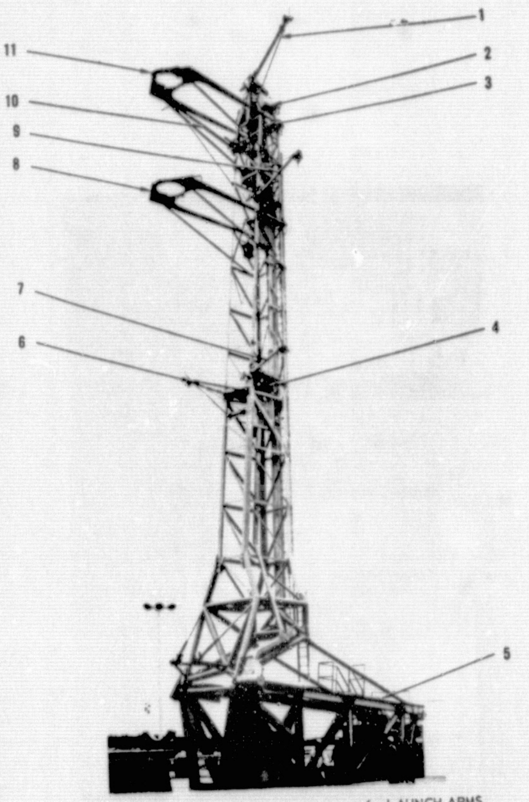
Figure 22.- Mark II Launcher and Transporter.



1. DISPLAY CONSOLE (REF. ONLY)
2. ALTAIR RESTRAINT RING
3. FOURTH STAGE CRADLE
4. ANTARES RESTRAINT RINGS
5. CASTOR RESTRAINT RINGS
6. ALGOL FWD RESTRAINT RINGS
7. ALGOL AFT RESTRAINT RING
8. WORK PLATFORM
9. SHORING JACK ASSEMBLY 10 REQ. (5 PLACES EACH SIDE)
10. SECOND STAGE CRADLE
11. THIRD STAGE CRADLE
12. LANDING GEAR
13. JOCKEY KING PIN



1. PITCH DRIVE ASSEMBLY
2. LAUNCHER CONTROL PANEL - AFWTR ONLY (SEE SHEET 2)
3. LUG ASSEMBLIES
4. BEAM ASSEMBLY
5. PAYLOAD FLYAWAY ARM
6. D SECTION SUPPORT ARMS
7. D SECTION FLYAWAY ARM
8. C SECTION UMBILICAL ARM
9. C SECTION SUPPORT ARMS
10. B SECTION UMBILICAL ARM
11. LAUNCH ARMS
12. SHIELD ASSEMBLY
13. BEARING ASSEMBLY
14. AZIMUTH DRIVE ASSEMBLY
15. LAUNCHER CONTROL PANEL - W.I. ONLY (SEE SHEET 3)
16. BASE STRUCTURE



1. PAYLOAD FLYAWAY ARM
2. PAYLOAD COOLING
3. D SECTION COOLING
4. LAUNCH ARMS NITROGEN BOTTLE
5. PITCH SPEED CONTROL
6. LAUNCH ARMS
7. B SECTION UMBILICAL ARM
8. C SECTION SUPPORT ARMS
9. C SECTION UMBILICAL ARM
10. D SECTION FLYAWAY ARM
11. D SECTION SUPPORT ARMS

Figure 23.- Mark II Launcher and Transporter, continued

SECTION I - SCOUT RESULTS

Scout has utilized 20 different configurations as itemized in table II. Scout-B and Scout-D are the present operational Scouts.

Table II lists the designations of the Scout configurations that were launched in Phases IV and V.

TABLE II - DESIGNATION OF SCOUT CONFIGURATIONS

CONFIGURATION	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE	PHASE IV & V QUANTITY LAUNCHED
X-4	Algol II	Castor I	Antares II	Altair II	None	2
X-4A	Algol II	Castor I	Antares II	Altair II	NOTS-17	1
X-5C	Algol II	Castor II	Antares II	None	None	1
A	Algol II	Castor II	Antares II	Altair II	None	11
B	Algol II	Castor II	Antares II	Altair III	None	24
*C	Algol II	Castor II	Antares II	Altair III	Be-3	0
**D	Algol III	Castor II	Antares II	Altair III	None	1

OTHER REFERENCE DESIGNATIONS:

Algol II-45KS-100,000
Algol III-Under development

Castor II-TX354-3

Antares II-X259, 33DS-21,540

Altair II-X258, XM-94, 24DS-5850
Altair III-FW,XSR-57-UT-1

BE-3, 9.15-DS-5770

*Sunblazer Program canceled.
**Developed for Phase VII and launched on the last Phase V vehicle after the period covered in this report.

The first Phase IV Scout (figure 7) was launched on November 18, 1965. Phase IV was completed on June 20, 1972 (figure 24) after launching fifteen DOD vehicles and ten NASA vehicles. Phase V was initiated and the first launch from Wallops Island occurred April 27, 1968 (figure 16). Phase V was completed November 16, 1972 (figure 25) after launching one DOD Scout vehicle and fourteen NASA vehicles.

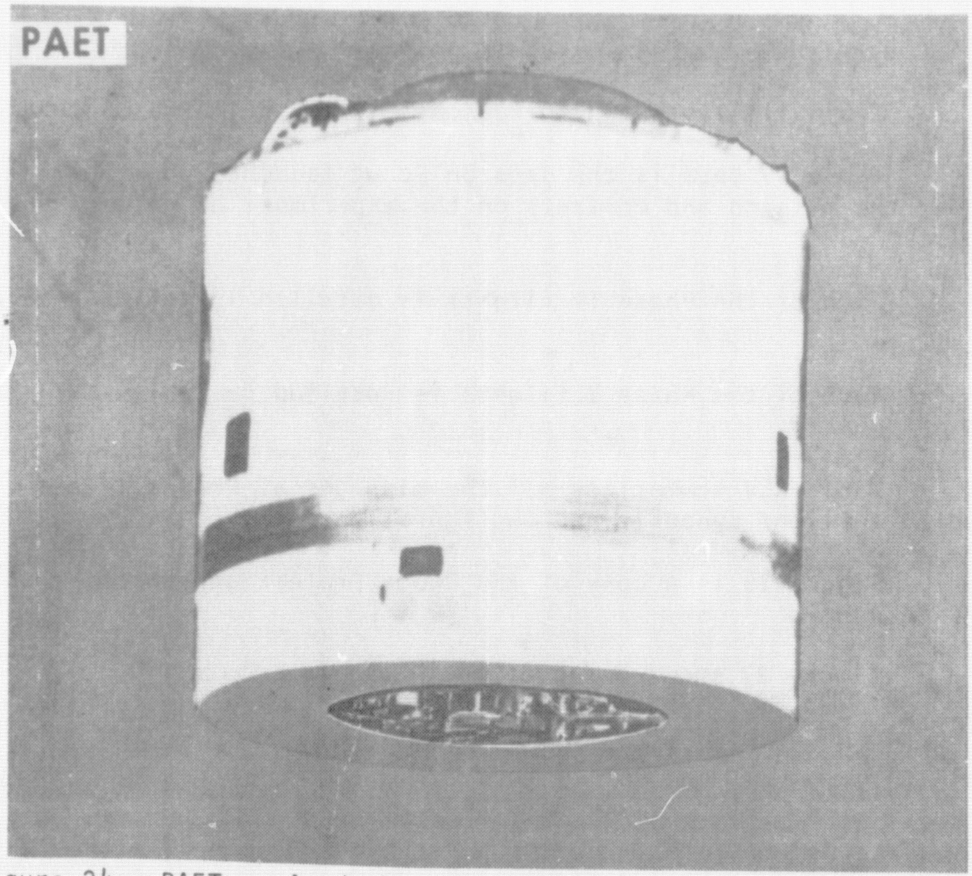


Figure 24.- PAET payload that was launched on Scout vehicle S-144CR. This launch concluded Phase IV.

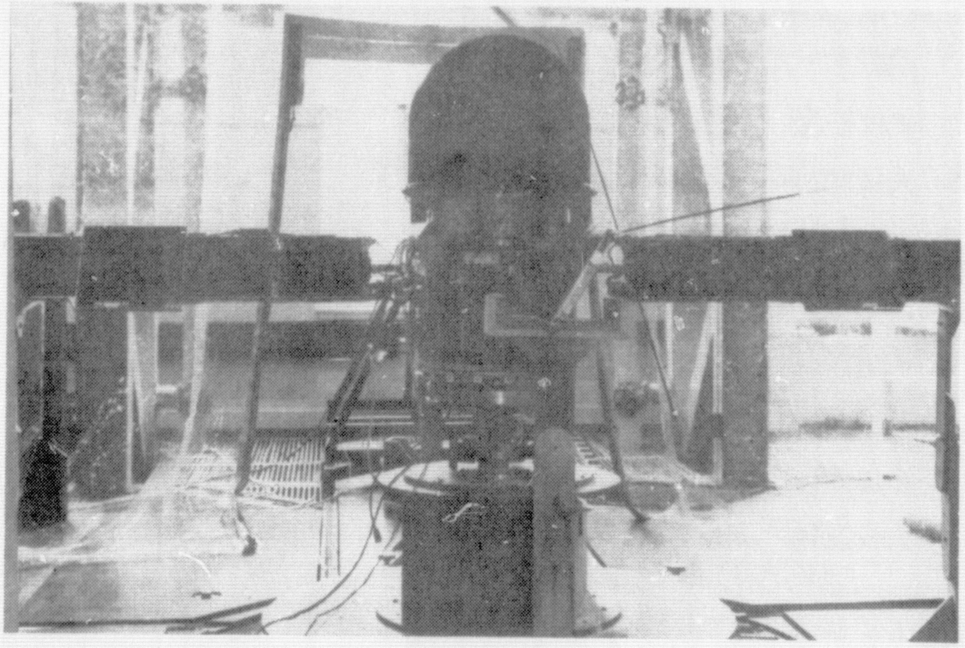


Figure 25.- Vehicle S-170C. This launch concluded Phase V.

Table III lists the 40 launches included in Phases IV and V.

Table IV details the data on Scout launches 38 through 81 and includes the mission and comments on the experiment as well as any anomalies.

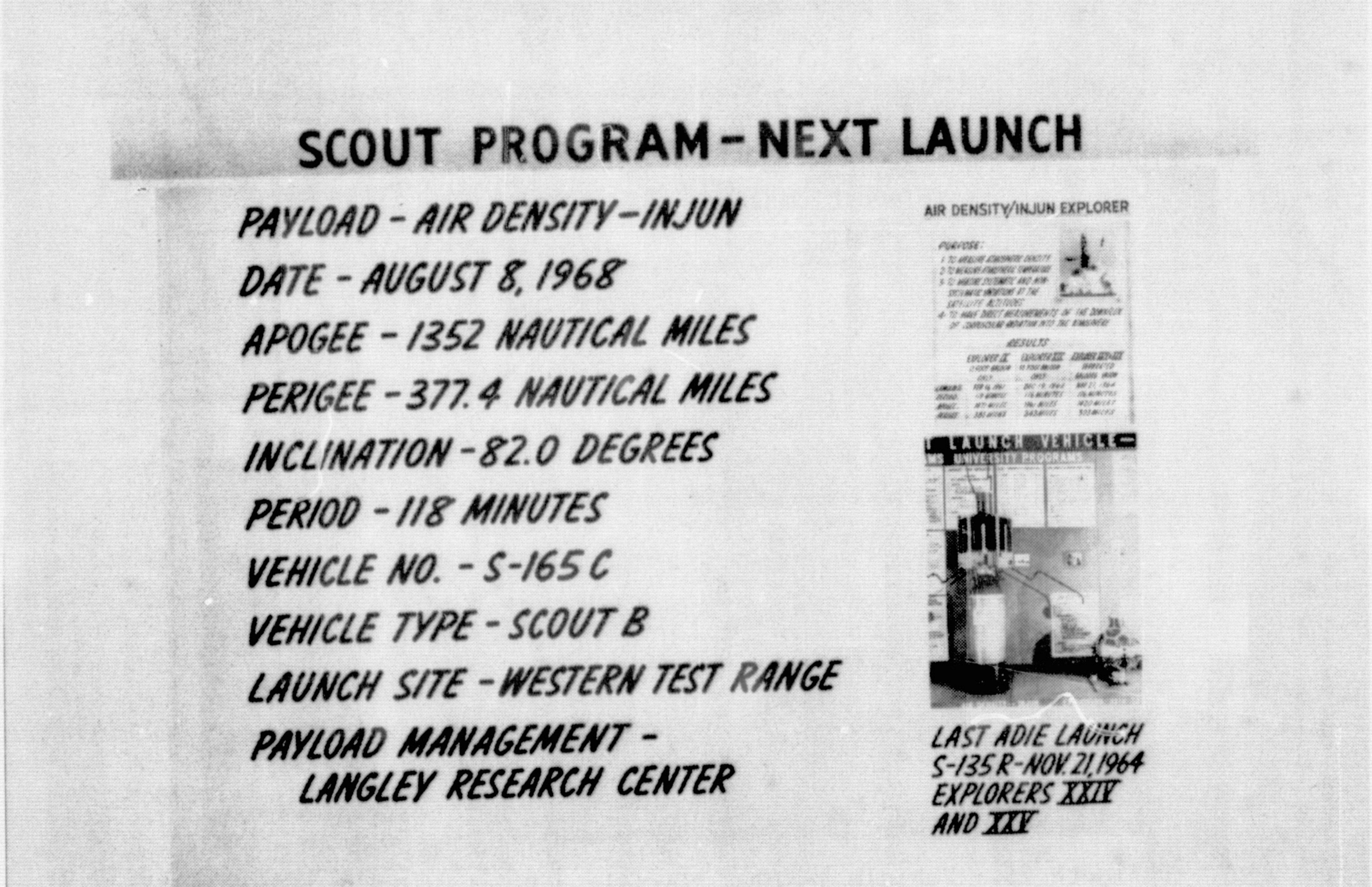
Each of the Phase IV flights is detailed in tables V through XXX.

Each of the Phase V flights is detailed in tables XXXI through XLIV.

Table XLV summarizes all the missions of Phases IV and V including a flight synopsis and configuration data.

Figure 26 is a copy of the Scout Project announcement of the S-165C launch.

Figure 27 shows a few of the Phase IV Scouts.



SCOUT PROGRAM - NEXT LAUNCH

PAYLOAD - AIR DENSITY - INJUN
DATE - AUGUST 8, 1968
APOGEE - 1352 NAUTICAL MILES
PERIGEE - 377.4 NAUTICAL MILES
INCLINATION - 82.0 DEGREES
PERIOD - 118 MINUTES
VEHICLE NO. - S-165 C
VEHICLE TYPE - SCOUT B
LAUNCH SITE - WESTERN TEST RANGE
PAYLOAD MANAGEMENT -
LANGLEY RESEARCH CENTER

AIR DENSITY/INJUN EXPLORER

LAST ADIE LAUNCH
S-135 R - NOV. 21, 1964
EXPLORERS XXIV
AND XXV

Figure 26.- Scout Project Announcement of S-165C launch.

TABLE III - SUMMARY OF RESULTS (Phases IV and V).

TOTAL					LAUNCH SITE		VEH.	LAUNCH				
LAUNCHES	NASA	NAVY	AF	CONF.	WALLOPS	WTR	NO.	FY	DATE	TYPE	RESULT	
PAYLOADS	(24)	(10)	(6)									
38	24			X-4	23		138R	66-2	11-18-65	0	S	PHASE IV
39(FR)	25			X-4		16	139R	66-3	12-06-65	0	S	
40		5		A		17	140C	66-4	12-21-65	0	S	
41		6		A		18	142C	66-5	1-28-66	0	S	
42	26			X-4A	24		141C	66-6	2-09-66	Re	S	
43		7		A		19	143C	66-7	3-25-66	0	S	
44			8	B		20	145C	66-8	4-22-66	0	S	
45		8		A		21	146C	66-9	5-18-66	0	S	
46			9	B	25		147C	66-10	6-09-66	0	S	
47			10	B		22	148C	67-1	8-04-66	0	S	
48		9		A		23	149C	67-2	8-17-66	0	S	
49			11	B		24	150C	67-3	10-28-66	0	S	
50			12	B		25	151C	67-4	1-31-67	0	F	
51		10		A		26	154C	67-5	4-13-67	0	S	
52	27(SM)			B	Africa-1		153C	67-6	4-26-67	0	S	
53	28			A		27	155C	67-7	5-05-67	0	S	
54		11		A		28	156C	67-8	5-18-67	0	S	
55	29			B		29	152C	67-9	5-29-67	0	F	
56		12		A		30	157C	68-1	9-25-67	0	S	
57	30			B	26		159C	68-2	10-19-67	Re	S	
58			13	B		31	158C	68-3	12-04-67	0	S	
59		13		A		32	162C	68-4	3-01-68	0	S	
60	31			B	27		160C	68-5	3-05-68	0	S	
62	33			B		33	161C	68-7	5-16-68	0	S	
73	43			B	32		144CR	71-6	6-20-71	Re	S	
61	32			X-5C	28		164C	68-6	4-27-68	Re	S	PHASE V
63	34			B		34	165C	69-1	8-08-68	0	S	
64	35			B	29		168C	69-2	8-22-68	Re	S	
65	36			B		35	167C	69-3	10-03-68	0	S	
66(ESRO)	37			B		36	172C	70-1	10-01-69	0	S	
67	38			B		37	169C	70-2	11-07-69	0	S	
68		14		A		38	176C	71-1	8-27-70	0	S	
69	39			B	30		171C	71-2	9-30-70	Re	S	
70	40			B	31		174C	71-3	11-09-70	0	S	
71	41			B	Africa-2		175C	71-4	12-12-70	0	S	
72	42(SM)			B	Africa-3		173C	71-5	4-24-71	0	S	
74	44			B	33		177C	72-1	7-08-71	0	S	
76	46			B	35		166C	72-3	9-20-71	P	S	
77	47			B	Africa-4		163CR	72-4	11-15-71	0	S	
81	50			D	Africa-5		170CR	73-3	11-16-72	0	S	

CODE:
A - Configuration A
AF - Air Force
B - Configuration B
C - Certified
D - Configuration D
F - Failure
FR - French
FY - Fiscal Year
0 - Orbit
P - Probe
R - Recertification
Re - Reentry
S - Success
SM - San Marco
X - Configuration X

TABLE IV - SCOUT FLIGHT SUMMARY (Operational)

Flt. no.	Vehicle no.	Launch site	Date	Mission	Apogee (pred.) n.m.	Perigee (pred.) n.m.	Incl. (deg.)	Vehicle Perform	Experiment	Remarks
*38	S-138R	WI(24)	11-18-65	Orbital	481.3 (542.6)	367.4 (383.7)	59.716 (60.188)	Success	Explorer XXX. Solar Explorer A-IQSY-NRL. Period 102.8 min.	First X-258E6 motor with elastometric joint in nozzle. Seven month field standby prior to launch. Equipped with "E" section and was doglegged.
INCENTIVE CONTRACT (SYSTEMS MANAGEMENT)										
39	S-139R	WTR(25)	12-6-65	Orbital	421.6 (404.32)	401.3 (402.02)	75.9 (75.70)	Success	French experiment. Period 99.99 min.	First air transport from WI to WTR. First launch using new standard launch complex.
40	S-140C	WTR	12-21-65	Orbital	590.0 (535.4)	495.7 (506.2)	89.104 (89.996)	Success	Navy. Period 105.033 min.	First configuration A.
41	S-142C	WTR	1-28-66	Orbital	660.6 (531.7)	470.2 (487.14)	89.7 (90.0)	Success	Navy. Period 105.95 min.	
42	S-141C	WI(26)	2-9-66	Reentry				Success	Re-E - LRC five-stage reentry materials test. (26,854 ft/sec)	

( ) NASA launches   ( ) Predicted

(Continued on next page)

WI - Wallops Island, Virginia.
WTR - Western Test Range, Point Arguello, California (formerly PMR).

*Preceding data in Phases I, II, and III.

TABLE IV - SCOUT FLIGHT SUMMARY (Operational) Continued

Flt. no.	Vehicle no.	Launch site	Date	Mission	Apogee (pred.) n.m.	Perigee (pred.) n.m.	Incl. (deg.)	Vehicle perform.	Experiment	Remarks
43	S-143C	WTR	3-25-66	Orbital	613.4 (529.3)	486.0 (482.9)	89.73 (90.0)	Success	Navy - Period 105.33 min.	
44	S-145C	WTR	4-22-66	Orbital	3102.3 (3114.7)	195.2 (200.5)	82.46 (82.0)	Success	Air Force - Radiation Research satellite. Period 151.7 min.	Air-transported to WTR. First configuration B from WTR.
45	S-146C	WTR	5-18-66	Orbital	534.6 (547.3)	469.1 (491.9)	90.00 (90.0)	Success	Navy - Period 103.4 min.	
46	S-147C	WI	6-9-66	Orbital	2558.3 (2519.6)	351.5 (348.8)	40.82 (40.99)	Success	Air Force - Radiation Research satellite. Period 143.2 min.	
47	S-148C	WTR	8-4-66	Orbital	2423.8 (2439.4)	200.4 (198.6)	81.47 (82.00)	Success	Air Force - Radiation Research satellite. Period 136.92 min.	
48	S-149C	WTR	8-17-66	Orbital	602.3 (619.0)	571.5 (577.2)	88.85 (90.0)	Success	Navy - Period 106.77 min.	
49	S-150C	WTR	10-28-66	Orbital	868.2 (867.6)	176.4 (178.7)	81.98 (82.10)	Success	Air Force - Environmental Science experiment. Period 104.17 min.	
50	S-151C	WTR	1-31-67	Orbital				Failure	Air Force - Cambridge Research Lab. experiment.	FW-4S nozzle failure. Conducted nozzle test program. Redesigned nozzle insert.
51	S-154C	WTR	4-13-67	Orbital	592.2 (625.1)	566.8 (577.1)	90.25 (90.00)	Success	Navy - Period 106.51 min.	New N_2 stainless tubing.
52	S-153C	Africa (27)	4-26-67	Orbital	404.50 (432.3)	118.13 (117.0)	2.892 (2.92)	Success	San Marco. Period 94.28 min.	First FW-4S with new nozzle insert. First equatorial launch from water platform. Launched by Italian crew. Decayed 10-14-67.
53	S-155C	WTR(28)	5-5-67	Orbital	328.7 (289.5)	271.5 (279.4)	80,18 (80.00)	Success	Ariel III (UK/GSFC) - Period 94.5 min.	Not standard separation system, special timer.
54	S-156C	WTR	5-18-67	Orbital	595 (626.081)	578 (578.825)	89.5 (90.0)	Success	Navy - Period 107.6 min.	
55	S-152C	WTR(29)	5-29-67	Orbital				Failure	ESRO-IIA.	Third-stage thrust termination. Investigation in process.

( ) NASA launches ( ) Predicted

WI - Wallops Island, Virginia.
WTR - Western Test Range, Point Arguello, California (formerly PMR).

TABLE IV - SCOUT FLIGHT SUMMARY (Operational) Continued

Flt. No.	Vehicle No.	Launch Site	Date	Mission	Apogee (pred.) n.m.	Perigee (pred.) n.m.	Incl. (deg.)	Vehicle Perform.	Experiment	Remarks
56	S-157C	WTR	9-25-67	Orbital	604.5 (620.3)	565.8 (567.8)	89.28 (90.0)	Success	Navy. Period 106.78 min.	
57	S-159C	WI(30)	10-19-67	Reentry				Success	RAM-C-A. LRC Communications Measurements. (25,008 ft/sec)	
58	S-158C	WTR	12-4-67	Orbital	241.91 (242.8)	226.33 (237.49)	90.67 (90.00)	Success	Air Force Radiation Research Satellite. Period 93.05 min.	Decayed 3-9-69.
59	S-162C	WTR	3-1-68	Orbital	614.5 (627.5)	557.79 (581.2)	89.99 (90.0)	Success	Navy. Period 107.08 min.	
60	S-160C	WI(31)	3-5-68	Orbital	474.4 (461.8)	281.8 (460.0)	59.42 (60.0)	Success	Explorer XXXVII SOLRAD. Period 98.77 min.	First Stage defect at 33 sec. Algol nozzle manufacturing defect. Algol nozzle redesigned.
61	S-164	WI(32)	4-27-68	Reentry				Success	Reentry-F. LRC Nose Cone (19,572 ft/sec)	First Phase V vehicle from Wallops Station.
62	S-161C	WTR(33)	5-16-68	Orbital	589.8 (593.8)	181.7 (190.4)	97.20 (98.20)	Success	Explorer XXXVIII ESRO-IIB. Period 98.91 min.	"E" Section timer defect discovered prior to launch. Redesign has been initiated.
63	S-165	WTR(34)	8-8-68	Orbital	1370 (1318)	370.1 (376.4)	80.66 (82)	Success	Explorers XXXIX and XL Air Density Experiment and Injun. Period 118.2 min.	Second dual launch. First Algol IIC nozzle; first Phase V vehicle from WTR.
64	S-168	WI(35)	8-22-68	Reentry				Success	RAM-C-B. LRC Communications Measurements. (24,986 ft/sec)	
65	S-167	WTR(36)	10-3-68	Orbital	831.7 (809.4)	142.5 (146.8)	93.758 (93.999)	Success	Explorer XLI. Period 102.8 min. ESRO-IA	
66	S-172	WTR(37)	10-1-69	Orbital	212.2 (237.85)	164.7 (216.0)	85.13 (86.0)	Success	ESRO-IB Borealis. Period 92.0 min. Ionospheric & Auroral Experiment.	First reimbursable International Scout. Slight pitch-down thrust 3rd-stage misalinement and .81% lower performing FW4S. Decayed 11-23-69.
67	S-169C	WTR(38)	11-7-69	Orbital	1704.3 (1744.4)	213.4 (214.8)	102.975 (102.670)	Success	GRS-A - AZUR. Period 121.8. (Seven experiments)	

( ) NASA Launches ( ) Predicted

WI - Wallops Island, Virginia.
WTR - Western Test Range, Point Arguello, California (formerly PMR).

TABLE IV - SCOUT FLIGHT SUMMARY (Operational) Concluded

Flt. No.	Vehicle No.	Launch Site	Date	Mission	Apogee (pred.) n.m.	Perigee (pred.) n.m.	Incl. (deg.)	Vehicle Perform.	Experiment	Remarks
68	S-176	WTR	8-27-70	Orbital	664.60 (627.13)	519.85 (586.02)	90.02 (90.00)	Success	Navy. Period 107.0 min.	First Roll-Yaw Compensator. Improved D-section spin bearing rotational joint stiffness evaluation.
69	S-171	WI(39)	9-30-70	Reentry				Success	RAM-C-C. LRC Communications Measurements. (24,032 ft/sec.) Flight Path Angle-15.42°	Altitude 465,000 ft.
70	S-174	WI(40)	11-9-70	Orbital	288.94 (317.43)	165.91 (169.68)	37.424 (37.686)	Success	OFO. Period 92.82 min.	First with frogs aboard. Early firing of timer.
71	S-175	Africa(41)	12-12-70	Orbital	308.63 (301.57)	287.42 (289.31)	3.036 (2.914)	Success	SAS-A. Period 95.69. Explorer XLII.	First American satellite from San Marco platform.
72	S-173	Africa(42)	4-24-71	Orbital	390.4 (424.4)	120.0 (115.2)	3.24 (2.91)	Success	San Marco-C. Period 94.1 min.	
73	S-144	WI(43)	6-20-71	Reentry				Success	PAET-A. 21,050 ft/sec.	First 42-inch Heat Shield. (H.S. Instrumented.)
74	S-177	WI(44)	7-8-71	Orbital	345.28 (323.44)	238.94 (304.80)	51.05 (51.43)	Success	Explorer XLIV. SOLRAD-10(C). Period 95.3	Third in series in NASA/NRL cooperative program. Included analog current sensors.
+75	S-180	WI(45)	8-16-71	Orbital	493.33 (485.88)	369.80 (483.36)	50.16 (50.0)	Success	EOLE. (CAS-A). Period 101 min. E-Section T/M	First vehicle of Phase VI. First Algol IIC nozzle, first S-band D-section T/M system temperature inst. veh. Anomaly roll rate gyro.
76	S-166	WI(46)	9-20-71	Probe			58.97 (58.90)	Success	GRP-A. *Actuals: Lat.-6.93°N; Long.-74.40°W; Alt.-16,997 n.m. (SAT-B) Vel.= 31,337 fps : Flt. Time 12,831.6 sec	First Algol IIC Nozzle. 17 Countdowns due to weather conditions at downrange sites. Barium release at 17,574.8 n.m. slant range
77	S-163	Africa(47)	11-15-71	Orbital	14,531.5 (15,433.2)	119.3 (120.1)	3.6 (3.5)	Success	SSS-A. Period 469 min. Explorer XLV.	First E-G Section. First 34-inch -40 sta. heat shield.
+78	S-183	WTR(48)	12-11-71	Orbital	323.6 (299.7)	261.7 (297.0)	83.0 (83.0)	Success	UK-4. Period 95.2 min.	
+79	S-184	WI(49)	8-13-72	Orbital	444.159 (427.21)	272.09 (263.38)	37.685	Success	MTS-A. Period 97.836 min. Explorer XLVI.	First Algol III. New Jet Vane, Fins, Fourth Stage T/M Rings, First use of four IKS75 motors.
+80	S-182	WTR	9-2-72	Orbital	457.58 (494.54)	405.32 (449.91)	90.13	Success	INS-1. Period 100.639 min.	First Scout experience with RTG.
81	S-170	Africa(50)	11-16-72	Orbital	632.36 (555.3)	443.76 (554.1)	1.896 (1.770)	Success	SAS-B. Period 95.4 min.	First Algol III with large heat shield. Exceeded continuous successful launches of any NASA vehicle (26).

( ) NASA Launches.

WI - Wallops Island, Virginia.
WTR - Western Test Range, Point Arguello, California (formerly PMR).
*Three-station triangulation of actual release sighting.
+Phase VI launches.
NOTE: Attitude based on a mean earth radius of 3439.57 N. Mi.

TABLE V - SCOUT S-138 POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 38	LAUNCH TIME (LOCAL) 2348 EST	LAUNCH DATE 18 November 1965	LAUNCH SITE Mark II Launcher, Wallops Island, Va.,	S
PAYLOAD TYPE BOLRAD EXPLORER 30	PAYLOAD WEIGHT LBS 125.0	MISSION TYPE 1965 93A	SCOUT MISSION TYPE NO 27	SUCCESS RATIO* 14/15 = 0.933

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 129.00	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 312	WIND SPEED, KNOTS 8
RELATIVE HUMIDITY, % (Dew Point 24°F)	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 40	BAROMETER, "HG 29.99

REMARKS

A slight "hold" resulted from slightly lower-than-normal Base "A" battery voltage and three holds resulted from ships in the first-stage impact area.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-26	SPIN MOTORS (4) 1.0KS40		"E" SECTION T/M Yes
FIRST-STAGE MOTOR ALGOL IIB, S/N 35	SECOND-STAGE MOTOR CASTOR I, S/N 178	THIRD-STAGE MOTOR X259-A3, S/N HPC-154	FOURTH-STAGE MOTOR X258-E6, S/N RH-125

INSTRUMENTATION

1. Velocity Meter installed in "E" section.
2. Added 5 vibrometers in "E" section.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	544.0	483.1	-60.9
PERIGEE, N. MI.	383.7	386.6	+2.9
INCLINATION, DEG	60.19	59.70	-0.49
MAXIMUM VELOCITY FPS	--	--	--
ALTITUDE, N. MI.	--	--	--
SPIN RATE AT SEPARATION RPM	177.2	179.5	+2.3 (+1.3 %)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 173.0	3RD STAGE 17.8
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 51.0	3RD STAGE BOOST 6.4
2ND STAGE COAST --	3RD STAGE COAST 0.60
	RETRO 9.70
SPIN BEARING TORQUE, IN-LBS N/A	

TELEMETRY COVERAGE

Wallops Island, Coquina Beach and Bermuda stations provided "D" section T/M coverage. Antigua and a NASA airborne station (A/C 232) provided "E" section T/M coverage; intermittent dropout was experienced during fourth-stage burning and about 50% of the time on the airborne records.

REMARKS AND/OR ANOMALIES

1. Yaw torquing, programmed to achieve a specific orbit inclination, was successful.
2. Velocity meter provided highly accurate rocket motor performance data.
3. Wallops Island AN/FPS-16 provided radar coverage from 1 to 350 seconds; Wallops Island AN/FPQ-6 provided radar coverage from 302 to 629 seconds; and Bermuda AN/FPS-16 provided radar coverage from 234 to 691 seconds.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Report 3-30000/5R-24, Rev. A, dtd 10/18/65 and Rev. B dtd 11/8/65	TRANSMITTAL LETTER LTV Letters 3-15000/5L-5101 dtd 19 October 1965 & 3-15000/5L-5201 dtd 10 November 1965
FINAL FLIGHT REPORT LTV Report 3-30000/6R-4, dated 23 February 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-111 (w/encl. (1) 3-15000/6L-3513) dtd 28 February 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE VI - SCOUT S-139 POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 39	LAUNCH TIME (LOCAL) 1305 PST	LAUNCH DATE 6 December 1965	LAUNCH SITE PALC D, SVAFB, Calif.	S
PAYLOAD TYPE FR-1	PAYLOAD WEIGHT LBS 153.1	MISSION TITLE 1965 101A	SCOUT MISSION TYPE NO 28	SUCCESS RATIO* 15/16 = 0.938

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 164.511	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 290	WIND SPEED, KNOTS 2
RELATIVE HUMIDITY, % N/A	VISIBILITY, STATUTE MILES Unlimited	TEMPERATURE, °F 72	BAROMETER, "HG 29.56

REMARKS

Countdown normal except for a short hold caused when the "D" arm interlock dropped out.

CONFIGURATION

HEAT SHIELD 34/25, S/N A-28	SPIN MOTORS (4) 1.0KS40		HEAT SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 37	SECOND-STAGE MOTOR CASTOR I, S/N 189	THIRD-STAGE MOTOR X259-A3, S/N HPC-165	FOURTH-STAGE MOTOR X258-E6, S/N RH-126

INSTRUMENTATION

Added vibrometers on third-stage H_2O_2 tanks.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	404.3	415.2	+10.9 $(+0.27\sigma)$
PERIGEE, N. MI.	402.0	408.3	+6.3 $(+0.16\sigma)$
INCLINATION, DEG	75.70	75.88	+0.18 $(+0.57\sigma)$
MAXIMUM VELOCITY FPS	--	--	--
ALTITUDE, N. MI.	--	--	--
SPIN RATE AT SEPARATION RPM	169.7	N/A	--

H_2O_2 ON BOARD AT LIFT OFF LBS	
3RD STAGE 169.5	4TH STAGE 19.5
H_2O_2 CONSUMED, LBS	
3RD STAGE BOOST 41.7	4TH STAGE BOOST 3.2
3RD STAGE COAST --	4TH STAGE COAST 2.1
	RETRO 13.2
SPIN BEARING TORQUE	

TELEMETRY COVERAGE

South Vandenberg provided coverage from lift-off with intermittent loss of signal at 6 to 15, 27 to 30, 9[illegible] to 109 and 130 to 153 seconds. San Nicholas Island provided coverage from 0 to 627 seconds with intermittent loss of signal subsequent to 475 seconds.

REMARKS AND/OR ANOMALIES

1. All vehicle systems operated satisfactorily.
2. SVAFB AN/FPS-16 radar coverage was provided from 3 to 636 seconds with significant scatter in the data after 330 seconds.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Report 3-30000/5R-37, dated 1 November 1965	TRANSMITTAL LETTER LTV Letter 3-15000/5L-5162, dated 29 October 1965
FINAL FLIGHT REPORT LTV Report 3-30000/6R-6, dated 18 March 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-155 (w/encl (1), 3-15000/6L-3663), dated 22 March 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE VII - SCOUT S-140C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 40	LAUNCH TIME (LOCAL) 2033 PST	LAUNCH DATE 21 December 1965	LAUNCH SITE PALC D, SVAFB, Calif.	S
PAYLOAD TYPE N-5	PAYLOAD WEIGHT LBS 144.5	MISSION TYPE 1965 109A	SCOUT MISSION TYPE NO. 29	SUCCESS RATIO* 16/17 = 0.941

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 181.68	LAUNCH ELEVATION, DEG 90	WIND DIRECTION, DEG 120	WIND SPEED, KNOTS 8
RELATIVE HUMIDITY, % 85	VISIBILITY, STATUTE MILES 15	TEMPERATURE, °F 45	BAROMETER, "HG 29.475

REMARKS

Normal

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-14	SPIN MOTORS (2) 0.6KS40; (2) 1.0KS40		"E" SECTION TM No
FIRST-STAGE MOTOR ALGOL IIB, S/N 38	SECOND-STAGE MOTOR CASTOR II, S/N 24	THIRD-STAGE MOTOR X259-A3, S/N HPC-173	FOURTH-STAGE MOTOR X258-E6, S/N RH-129

INSTRUMENTATION

Vibrometer added on second-stage N_2 regulator and aft shoulder of CASTOR II motor.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	535.4	590.0	+54.6 ($+1.33\sigma$)	2ND STAGE 176.5	3RD STAGE 19.4
PERIGEE, N. MI.	506.2	495.7	-10.5 (-0.44σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	89.996	89.104	-0.892 (-2.74σ)	2ND STAGE BOOST 41.1	3RD STAGE BOOST 5.1
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST --	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 12.9
SPIN RATE AT SEPARATION RPM	151.74	156.67	+4.93 (+3.2 %)	SPIN BEARING TORQUE, IN-LBS 18.42	

TELEMETRY COVERAGE

Good quality data were provided by South Vandenberg and San Nicholas Island T/M stations to beyond retro. South Vandenberg experienced dropout during third-stage burning. San Nicholas acquired signal at 12 seconds flight time.

REMARKS AND/OR ANOMALIES

1. All systems performed normally but an adverse build-up of incremental error sources caused a higher-than-normal inclination error of 0.892 deg (2.74 sigma).
2. SVAFB AN/FPS-16 radar coverage was provided from 5 seconds to 670 seconds except for data dropout periods of 1-3/4 seconds at approximately 80 and 124 seconds.
3. A 60-second interruption in C/D function occurred when transfer was inadvertently made to Point Pillar rather than San Nicholas Island.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Report 3-30000/5R-40, dtd 6 Dec. 1965 w/Rev.A dtd 12/17/65	TRANSMITTAL LETTER LTV Ltrs. 3-15000/5L-5519 dtd 9 Dec. 1965 and 3-15000/6L-3023 dtd 1/7/66
FINAL FLIGHT REPORT LTV Report 3-30000/6R-7, dtd 3/17/66 w/Rev. A dtd 4/5/66	TRANSMITTAL LETTER LTV Ltrs. 3-15000/6L-152 (w/encl. (1) 3-15000/6L-3657) dtd 3/21/66 and 3-15000/6L-3780 dtd 4/13/66

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE VIII - SCOUT S-141C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 42	LAUNCH TIME (LOCAL) 1955 EST	LAUNCH DATE 9 February 1966	LAUNCH SITE Mark II Launcher, Wallops Island, Va.	S
PAYLOAD TYPE Re-E	PAYLOAD WEIGHT LBS 394	MISSION TYPE Re-entry	SCOUT MISSION TYPE NO. 7	SUCCESS RATIO* 18/19 = 0.947

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 127.35	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 101	WIND SPEED, KNOTS 5.7
RELATIVE HUMIDITY, % --	VISIBILITY, STATUTE MILES 5	TEMPERATURE, °F 34	BAROMETER, "HG 30.62

REMARKS

Holds at T - 30 and T - 14 minutes caused by ship in the first-stage impact area and by downrange support problems.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-24	SPIN MOTORS (4) 1.0KS40		"E" SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 40	SECOND-STAGE MOTOR CASTOR , S/N 190	THIRD-STAGE MOTOR X259-A3, S/N HP-172	FOURTH-STAGE MOTOR X258-E6, S/N RH-117
INSTRUMENTATION Added Spin Bearing Support temperature measurement.			FIFTH-STAGE MOTOR NOTS 100B, S/N 63

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
				2ND STAGE	3RD STAGE
APOGEE, N. MI.	--	--	--	180	19.2
PERIGEE, N. MI.	--	--	--	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	--	--	--	2ND STAGE BOOST 38.6	3RD STAGE BOOST 6.20
MAXIMUM VELOCITY FPS	26888	26854	-34	2ND STAGE COAST --	3RD STAGE COAST --
ALTITUDE, N. MI.	56.80	54.57	-2.23		RETRO 11.7
SPIN RATE AT SEPARATION RPM	169.2	174.2	+5.0 (+2.87%)	SPIN BEARING TORQUE, IN-LBS 34.29	

TELEMETRY COVERAGE

Wallops Island provided coverage to 443 seconds except for intermittent data from 103 to 113 seconds and 284 to 286 seconds and loss of signal from 272 to 283 seconds; Coquina Beach provided coverage from 23 to 433 seconds except for intermittent dropout from 101 to 112 seconds and loss of signal from 273 to 291 seconds; Bermuda provided coverage from 113 to 455 seconds except for intermittent dropout from 120 to 122 seconds and 440 to 455 seconds.

REMARKS AND OR ANOMALIES

1. Payload delay T/M transmitter failed at fifth-stage ignition.
2. Third-stage chamber pressure showed sudden drop of 45 psi at 4 seconds stage time for about 12 seconds, probably caused by conduction from a high voltage pin through ionized gasses from the staging circuit.
3. The "D" section longitudinal accelerometer apparently 'sticking' 4-1/2 seconds after third-stage ignition.
4. Wallops Island AN/FPS-16 provided radar coverage from 1 to 332 seconds; Bermuda AN/FPS-16 provided coverage from 314 to 419 seconds. Quality of data was satisfactory.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/6R-2 dtd 14 January 1966 w/Rev. A dtd 29 December 1965	TRANSMITTAL LETTER LTV Ltrs. 3-15000/6L-3235 dtd 14 January 1966 and 3-15000/6L-3279 dtd 21 January 1966
FINAL FLIGHT REPORT LTV Report 3-30000/6R-15, dated 18 May 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-275 (w/encl. (1), 3-15000/6L-4026) dtd 20 May 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE IX - SCOUT S-142C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 41	LAUNCH TIME (LOCAL) 0906 PST	LAUNCH DATE 28 January 1966	LAUNCH SITE SLC-6, SVAFB, Calif.	S
PAYLOAD TYPE N-6	PAYLOAD WEIGHT LBS 140.8	MISSION TYPE 1966 5A	SCOUT MISSION TYPE NO 30	SUCCESS RATIO* 17/18 = 0.944

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 182.001	LAUNCH ELEVATION, DEG 90.00	WIND DIRECTION, DEG --	WIND SPEED, KNOTS 0
RELATIVE HUMIDITY, % --	VISIBILITY, STATUTE MILES 15	TEMPERATURE, °F 55	BAROMETER, "HG 29.895

REMARKS

During Task 4 (RCS fueling) the third-stage H_2O_2 supply valve failed to actuate; problem was corrected by jumpering the switch.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-22	SPIN MOTORS (2) 0.6KS40; (2) 1.0KS40		"E" SECTION T.M. No
FIRST-STAGE MOTOR ALGOL IIB, S/N 44	SECOND-STAGE MOTOR CASTOR II, S/N 17	THIRD-STAGE MOTOR X259-A3, S/N HPC-169	FOURTH-STAGE MOTOR X258-E6, S/N RH-116

INSTRUMENTATION

1. Third-stage chamber pressure trace had abrupt shift for 0.45 second at 132 seconds due to instrumentation anomaly (possibly conduction of current from a high-voltage pin through ionized gases from the staging circuit. 2. X259 nozzle shield temperature exceeded readable limit of the thermistor.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	531.7	660.7	+129.0 ($+3.16\sigma$)	2ND STAGE 173.0	3RD STAGE 18.80
PERIGEE, N. MI.	487.1	470.1	-17.0 (-0.70σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	90.00	89.71	-0.29 (-0.92σ)	2ND STAGE BOOST 43.9	3RD STAGE BOOST 4.14
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST --	3RD STAGE COAST 1.58
ALTITUDE, N. MI.	--	--	--		RETRO 12.10
SPIN RATE AT SEPARATION RPM	155.3	147.9	-7.4 (-4.8 %)	SPIN BEARING TORQUE, IN-LBS 25.77	

TELEMETRY COVERAGE

SVAFB provided poor quality coverage to 865 seconds except during third-stage burning; intermittent dropout between 7 and 22, 97 and 116, and 770 and 805 seconds; loss of signal from 697 to 710 seconds. SNI provided very good quality coverage from 8 to 900 seconds except for intermittent dropout between 105 and 113 seconds.

REMARKS AND/OR ANOMALIES

1. Random failure of 40 KC SCO caused loss of signal on this telemetry channel from 132 to 689 seconds.
2. Interference experienced with the wire bundle clamp and two spin disconnects between third and fourth stages during spin-up (not detrimental to flight).
3. SVAFB AN/FPS-16 provided random coverage from 2 to 704 seconds; loss of data at second and third-stage ignitions and excessive scatter on several trajectory parameters after 270 seconds.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/5R-42 dtd 21 December 1965 w/Rev. dtd 29 December 1965 and 24 January 1966	TRANSMITTAL LETTER LTV Ltrs. 3-15000/5L-5593 dtd 12/22/65, 3-15000/5L-5618 dtd 12/29/65, 3-15000/6L-3292 dtd 1/25/66
FINAL FLIGHT REPORT LTV Report 3-30000/6R-10, dated 3 May 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-242 (w/encl. (1), 3-51000/6L-3930) dtd 6 May 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE X - SCOUT S-143C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO 43	LAUNCH TIME, LOCAL 1931 PST	LAUNCH DATE 25 March 1966	LAUNCH SITE SLC-6, SVAFB, Calif.	S
PAYLOAD TYPE N-7	PAYLOAD WEIGHT LBS 144.3	MISSION TYPE 1966 24A	SCOUT MISSION TYPE NO 31	SUCCESS RATIO 19/20 = 0.950

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 182.001	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 320	WIND SPEED, KNOTS 5
RELATIVE HUMIDITY % 89	VISIBILITY, STATUTE MILES 7	TEMPERATURE, °F 56	BAROMETER, "HG 29.75

REMARKS

Countdown normal except for one 10-minute hold due to Range command-destruct transmitter supporting another operation.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-31	SPIN MOTORS (2) 0.6KS40; (2) 1.0KS40		"E" SECTION T M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 41	SECOND-STAGE MOTOR CASTOR II, S/N 16	THIRD-STAGE MOTOR X259-A3, S/N HPC-170	FOURTH-STAGE MOTOR X258-E6, S/N RH-118

INSTRUMENTATION

Standard

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	529.3	613.4	+84.1 (+2.05σ)	2ND STAGE 178.5	3RD STAGE 18.30
PERIGEE, N. MI.	482.9	486.0	+3.1 (+0.13σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	90.00	89.73	-0.27 (-0.84σ)	2ND STAGE BOOST 37.5	3RD STAGE BOOST 9.10
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 7.74
SPIN RATE AT SEPARATION RPM	153.4	155.1	+1.7 (+1.11σ)	SPIN BEARING TORQUE, IN-LBS 16.65	

TELEMETRY COVERAGE

SVAFB provided coverage to 840 seconds; intermittent dropout between 98 and 117 seconds; loss of signal during third-stage burning and several dropout periods between 640 and 840 seconds. Pt. Mugu provided coverage from 23 to 895 seconds; intermittent dropout occurred between 23 and 60, 98 and 116, and 704 to 895 seconds.

REMARKS AND/OR ANOMALIES

1. The maximum total thrust misalignment of the third-stage motor was 0.129 degree (design criteria 0.10 degree); it was in no way detrimental to flight since adequate control margin existed. Otherwise, all vehicle systems performed within specified limits.
2. SVAFB AN/FPS-16 and Pt. Mugu AN/FPS-16 provided radar coverage to 750 seconds with Pt. Mugu providing "best data" from 246 to 324 seconds; several trajectory parameters showed considerable scatter after 290 seconds.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Report 3-30000/6R-1, dtd 1/21/66 as revised 8 March 1966	TRANSMITTAL LETTER LTV Ltr 3-15000/6L-3273 dtd 1/21/66 and 3-15000/6L-3658 dtd 3/21/66
FINAL FLIGHT REPORT LTV Report 3-30000/6R-22, dated 17 June 1966	TRANSMITTAL LETTER LTV Ltr 3-15000/6L-342 (w/encl. (1), 3-15000/6L-4377) dtd 24 June 1966

VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XI - SCOUT S-144CR POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 73	LAUNCH TIME (LOCAL) 1531:00.21 EDT	LAUNCH DATE 20 June, 1971	LAUNCH SITE PAPE II Launcher Wallops Island, Va.

PAYLOAD TYPE PAET	PAYLOAD WEIGHT LBS 286.0	MISSION TYPE Re-entry	SCOUT MISSION TYPE NO 12	SUCCESS RATIO* 47/50 = 0.940

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 109.07	LAUNCH ELEVATION, DEG 89.94	WIND DIRECTION, DEG 82.	WIND SPEED, KNOTS 4.3
RELATIVE HUMIDITY % 74	VISIBILITY, STATUTE MILES 14	TEMPERATURE, °F 74	BAROMETER, "HG 30.008
REMARKS			

CONFIGURATION

HEAT SHIELD 42/-45, S/N A-502	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 77	SECOND-STAGE MOTOR CASTOR IIA, S/N 185	THIRD-STAGE MOTOR X-259-B3, S/N HIB-225	FOURTH-STAGE MOTOR FW-4S, S/N 2223-8
INSTRUMENTATION Standard "D" section T/M			

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	--	--	--	2ND STAGE 177.5	3RD STAGE 18.8
PERIGEE, N. MI.	--	--	--	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	--	--	--	2ND-STAGE BOOST 29.5	3RD-STAGE BOOST 4.8
MAXIMUM VELOCITY FPS	21,755	21,610	-145	2ND-STAGE COAST 64.5	3RD-STAGE COAST 0
ALTITUDE, N. MI.	49.91	55.63	+5.72		RETRO 13.0
SPIN RATE AT SEPARATION RPM	152.5	124.0	-28.5 (%)	SPIN BEARING TORQUE, IN-LBS 67.8	

TELEMETRY COVERAGE

REMARKS AND/OR ANOMALIES

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rept. 3-34100/1R-32 dated 14 May 1971	TRANSMITTAL LETTER LTV 3-34100/1L-3510 dated 19 May 1971
FINAL FLIGHT REPORT LTV Rept. 3-34100/1R-81 dated 17 December 1971, Rev. B, dated 20 April 1972	TRANSMITTAL LETTER LTV 3-34100/IL-4387, dated 20 December 1971, Revision: LTV3-34100/2L-3377, dated 28 April 1972

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XII - SCOUT S-145C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 44	LAUNCH TIME (LOCAL) 0145 PST	LAUNCH DATE 22 April 1966	LAUNCH SITE SLC-6, SVAFB, Calif.	S
PAYLOAD TYPE OV3-1	PAYLOAD WEIGHT LBS 152.3	MISSION TYPE 1966 34A	SCOUT MISSION TYPE NO 32	SUCCESS RATIO* 20/21 = 0.952

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 172.114	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 338	WIND SPEED, KNOTS 5
RELATIVE HUMIDITY, % 98	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 46	BAROMETER, IN HG 29.685

REMARKS

Countdown No. 1 (on 19 April) was "scrubbed" because of an apparent guidance circuit anomaly which was later determined to be a countdown procedure problem. Countdown No. 2 (on 22 April) was normal.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-29	SPIN MOTORS (4) 1.0KS40		"E" SECTION [illegible] No
FIRST-STAGE MOTOR ALGOL IIB, S/N 43	SECOND-STAGE MOTOR CASTOR II, S/N 20	THIRD-STAGE MOTOR X259-A3, S/N HPC-174	FOURTH-STAGE MOTOR FW-4S, S/N 20031A

INSTRUMENTATION

1. Added vibrometer on 500-lb motor valve (transv.) and second-stage motor aft shoulder (long.).
2. Added thermistor to measure spin bearing temperature.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	3114.7	3102.3	-12.4 (-0.13σ)	2ND STAGE 181.0	[illegible] STAGE 18.10
PERIGEE, N. MI.	200.5	195.2	-5.3 (-0.44σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	82.00	82.46	+0.46 (+1.26σ)	2ND STAGE BOOST 25.2	[illegible] 5.90
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST --	[illegible] STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 10.20
SPIN RATE AT SEPARATION RPM	138.6	140.7	+2.1 (+1.52σ)	SPIN BEARING [illegible] 37.03	

TELEMETRY COVERAGE

SVAFB provided coverage to 497 seconds; loss of signal 148 to 173 seconds. Pt. Mugu provided coverage from 9 to 562 seconds. SNI provided coverage from 8 to 590 seconds; loss of signal from 318 to 352 seconds. All three stations had intermittent signal from 115 to 122 seconds.

REMARKS AND OR ANOMALIES

1. A small object (believed to be guidance tunnel cover from lower "B" or "C" section) fell from vehicle 8 seconds after first-stage ignition. Object was not recovered and no discrepancies were noted in vehicle performance.
2. SVAFB AN/FPS-16 and Pt. Mugu AN/FPS-16 provided radar data from 10 to 520 seconds; scatter in all trajectory parameters present after 350 seconds.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/6R-5, dated 1 March 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-3535, dated 3 March 1966
FINAL FLIGHT REPORT LTV Report 3-30000/6R-20, dated 15 July 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-385 (w/encl. (1), 3-15000/6L-4532) dtd 21 July 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XIII - SCOUT S-146C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 45	LAUNCH TIME (LOCAL) 1927 PDT	LAUNCH DATE 18 May 1966	LAUNCH SITE SLC-6, SVAFB, Calif.	S
PAYLOAD TYPE N-8	PAYLOAD WEIGHT, LBS 143.9	MISSION TYPE 1966 41A	SCOUT MISSION TYPE NO. 33	SUCCESS RATIO* 21/22 = 0.955

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 181.996	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 030	WIND SPEED, KNOTS 4
RELATIVE HUMIDITY, % 93	VISIBILITY, STATUTE MILES 5	TEMPERATURE, °F 52	BAROMETER, "HG 29.655

REMARKS

Normal countdown with no problems.

CONFIGURATION

HEAT SHIELD 3-/-25, S/N A-32	SPIN MOTORS (2) 0.6KS40; (2) 1.0KS40		"E" SECTION TM No
FIRST-STAGE MOTOR ALGOL IIB, S/N 45	SECOND-STAGE MOTOR CASTOR II, S/N 18	THIRD-STAGE MOTOR X259-A3, S/N HPC-164	FOURTH-STAGE MOTOR X258-E6, S/N RH-110

INSTRUMENTATION

Added vibrometers to Base "A" servo amplifier (transv.) and first-stage motor aft shoulder (long).

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N.M.	547.3	534.6	-12.7 (-0.31σ)	2ND STAGE 177.0	3RD STAGE 18.50
PERIGEE, N.M.	491.9	469.1	-22.8 (-0.85σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	90.00	90.00	0 (0 σ)	2ND STAGE BOOST 29.5	3RD STAGE BOOST 5.60
MAXIMUM VELOCITY, FPS	--	--	--	2ND STAGE COAST --	3RD STAGE COAST --
ALTITUDE, N.M.	--	--	--		RETRO 11.90
SPIN RATE AT SEPARATION, RPS	153.3	154.3	+1.0 (+0.65%)	SPIN BEARING TORQUE, IN-LBS 39.11	

TELEMETRY COVERAGE

SVAFB provided coverage to 697 seconds with loss of signal from 130 to 155 seconds; signal intermittent from 105 to 114 seconds. SNI provided coverage from 7 to 875 seconds; signal was intermittent from 356 to 414 seconds and for brief periods after 687 seconds.

REMARKS AND OR ANOMALIES

1. All vehicle system performed within specified limits.
2. SVAFB AN/FPS-16 radar provided trajectory data from 11 to 707 seconds.

DOCUMENTATION

NASA PREFLIGHT PLANNING REPORT ☒ LAUNCH FLIGHT TEST PLAN LTV Rpt. 3-30000/6R-8 dtd 1 April 1966 w/Rev. A dtd 5 May 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-3751, dtd 1 April 1966, 3-15000/6L-3937 dtd 9 May 1966
FINAL FLIGHT REPORT LTV Rpt. 3-30000/6R-35 dtd 12 August 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-640 (w/encl. (1), 3-15000/6L-4757) dtd 18 August 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XIV - SCOUT S-147C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO 46	LAUNCH TIME (LOCAL) 0015 EDT	LAUNCH DATE 10 June 1966	LAUNCH SITE Mark II Launcher Wallops Island, Va.	S
PAYLOAD TYPE OV3-4	PAYLOAD WEIGHT LBS 171.0	MISSION TYPE 1966 52A	SCOUT MISSION TYPE NO 34	SUCCESS RATIO* 22/23 = 0.957

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 107.480	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 205	WIND SPEED, KNOTS 15
RELATIVE HUMIDITY, % 92	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 63	BAROMETER, "HG 29.96

REMARKS

First countdown (8 June) "scrubbed" due to rain; during second countdown, the 37-volt battery was replaced due to shorted cell (did not cause delay).

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-30	SPIN MOTORS (4) 1.0KS40		"E" SECTION No
FIRST-STAGE MOTOR ALGOL IIB, S/N 50	SECOND-STAGE MOTOR CASTOR II, S/N 19	THIRD-STAGE MOTOR X259-A3, S/N HPC-161A	FOURTH-STAGE MOTOR FW-4S, S/N 20039

INSTRUMENTATION

1. Added vibrometers on PCR box and 3rd-stage motor forward shoulder.
2. Added thermistors in "B" section to left yaw motor decomposition chamber and pressure switch, the H_2O_2 tank and the telemetry relay junction box.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFTOFF, LBS	
APOGEE, N. MI.	2519.6	2558.3	+38.7 (0.52 σ)	2ND STAGE 179.3	3RD STAGE 13.50
PERIGEE, N. MI.	348.7	351.5	+2.8 (0.23 σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	40.99	40.82	-0.17 (0.55 σ)	2ND STAGE BOOST 39.7	3RD STAGE BOOST 6.40
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST --	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 10.80
SPIN RATE AT SEPARATION RPM	130.4	136.7	+6.3 (+4.8%)	SPIN BEARING TORQUE, IN-OZ 32.25	

TELEMETRY COVERAGE

Wallops Island provided coverage to 745 seconds except for loss of signal from 135 to 156 seconds; Coquina Beach provided coverage from 13 to 632 seconds with intermittent data between 111 and 118 seconds; Bermuda provided coverage from 121 seconds to 896 seconds.

REMARKS AND OR ANOMALIES

1. Sticking potentiometer wiper in first-stage chamber pressure transducer probably accounted for sudden drop of 10 psia (1.3% of data bandwidth) at 43.5 seconds.
2. Wallops Island AN/FPS-16 provided radar coverage to 160 seconds and AN/FPQ-6 from 138 to 615 seconds (data scatter excessive in all trajectory parameters after 520 seconds); Bermuda AN/FPS-16 from 124 to 339 and 359 to 467 seconds provided only altitude data as a usable trajectory parameter.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Report 3-30000/6R-9, dated 3 May 1966	TRANSMITTAL LETTER LTV Letter 3-15000/6L-3928, dated 6 May 1966
FINAL FLIGHT REPORT LTV Report 3-30000/6R-24, dated 16 September 1966	TRANSMITTAL LETTER LTV Letter 3-15000/6L-489 (w/encl. (1), 3-15000/6L-4977), dated 22 September 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XV - SCOUT S-148C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 47	LAUNCH TIME (LOCAL) 0345 PDT	LAUNCH DATE 4 August 1966	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE OV3-3	PAYLOAD WEIGHT LBS 168.8	MISSION TYPE 1966 70A	SCOUT MISSION TYPE NO 35	SUCCESS RATIO* 23/24 = 0.958

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 172.156	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 030	WIND SPEED, KNOTS 7
RELATIVE HUMIDITY, % 100	VISIBILITY, STATUTE MILES 0.25	TEMPERATURE, °F 53	BAROMETER, "HG 29.595

REMARKS

Loss of telemetry pitch displacement channel during Task 2 considered acceptable anomaly and countdown was continued.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-33	SPIN MOTORS (4) 1.0KS40		"E" SECTION TM No
FIRST-STAGE MOTOR ALGOL IIB, S/N 39	SECOND-STAGE MOTOR CASTOR II, S/N 21	THIRD-STAGE MOTOR X259-A3, S/N HPC-183	FOURTH-STAGE MOTOR FW-4S, S/N 30105

INSTRUMENTATION

1. Added two "C" section H_2O_2 tank temperature thermistors.
2. Added "C" section H_2O_2 14-lb motor pressure switch temperature thermistor.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	2439.4	2423.8	-15.6 (-0.19 σ)	2ND STAGE 178.5	3RD STAGE 18.40
PERIGEE, N. MI.	198.6	200.4	+1.8 (0.15 σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	82.00	81.47	-0.53 (-1.41 σ)	2ND STAGE BOOST 40.0	3RD STAGE BOOST 6.50
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST 7.9	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 10.90
SPIN RATE AT SEPARATION RPM	129.1	134.7	+5.6 (+4.3 %)	SPIN BEARING TORQUE, IN-LBS 32.60	

TELEMETRY COVERAGE

Coverage was satisfactory for vehicle post-flight performance evaluation; SVAFB coverage was obtained to 510 seconds except for 148 to 171 seconds and SNI coverage was obtained from 5 to 525 seconds.

REMARKS AND/OR ANOMALIES

1. All vehicle systems performed within specified limits.
2. SVAFB AN/FPS-16 radar provided coverage to 510 seconds although scatter in several parameters was experienced after 330 seconds.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt.3-30000/6R-16, dtd 25 May 1966 w/Rev. A, dtd 11 July 1966	TRANSMITTAL LETTER LTV Ltr 3-15000/6L-4253, dtd 1 June 1966 & 3-15000/6L-4494 dtd 11 July '66
FINAL FLIGHT REPORT LTV Report 3-30000/6R-30, dated 4 November 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-566, (w/encl. (1) 3-15000/6L-5386) dated 10 November 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XVI - SCOUT S-149C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 48	LAUNCH TIME (LOCAL) 1925 PDT	LAUNCH DATE 17 August 1966	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE N-9	PAYLOAD WEIGHT LBS 130.5	MISSION TYPE 1966 76A	SCOUT MISSION TYPE NO. 36	SUCCESS RATIO* 24/25 = 0.960

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 181.946	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 010	WIND SPEED, KNOTS 6
RELATIVE HUMIDITY, % 88	VISIBILITY, STATUTE MILES 4	TEMPERATURE, °F 61	BAROMETER, "HG 29.59

REMARKS

Launcher N_2 pressure no-go at T - 4 minutes; readjusted 800-psi N_2 regulator to correct this condition.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-34	SPIN MOTORS (2) 0.6KS40; (2) 1.0KS40		"E" SECTION TM No
FIRST-STAGE MOTOR ALGOL IIB, S/N 48	SECOND-STAGE MOTOR CASTOR II, S/N 25	THIRD-STAGE MOTOR X259-A3, S/N HPC-177A	FOURTH-STAGE MOTOR X258-E6, S/N RH-36

INSTRUMENTATION

Standard

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	619.0	602.3	-16.7 (-0.40 σ)	2ND STAGE 176.5	3RD STAGE 18.65
PERIGEE, N. MI.	577.2	571.5	-5.7 (-0.22 σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	90.00	88.85	-1.15 (-3.57 σ)	2ND STAGE BOOST 31.9	3RD STAGE BOOST 4.60
MAXIMUM VELOCITY FPS	--	--		2ND STAGE COAST --	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--			RETRO 12.20
SPIN RATE AT SEPARATION RPM	157.9	159.3	1.4 (0.89 %)	SPIN BEARING TORQUE, IN-LBS 30.54	

TELEMETRY COVERAGE

SVAFB provided coverage to 877 seconds; loss of signal from 123 to 155, 741 to 744 and 753 to 845 seconds. SNI provided coverage from 10 to 1060 seconds; loss of signal from 900 to 906 seconds. (Radar data good through 360 seconds; subsequently, scatter was experienced in all trajectory parameters except altitude. SVAFB AN/FPS-16 coverage to 271 seconds; SNI AN/FPS-16 coverage 263 to 746 seconds.)

REMARKS AND OR ANOMALIES

1. A 1.15-deg deviation in inclination angle resulted from an adverse accumulation of errors including approximate 0.2-deg bias resulting from first-stage thermal induced roll.
2. Small 0.05 to 0.25-pound H_2O_2 leak in third-stage lower 2-pound pitch motor (did not compromise vehicle control).

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Report 3-30000/6R-21, dated 10 June 1966	TRANSMITTAL LETTER LTV Letter 3-15000/6L-4330, dated 13 June 1966
FINAL FLIGHT REPORT LTV Report 3-30000/6R-28, dated 31 October 1966	TRANSMITTAL LETTER LTV Letter 3-15000/6L-555, (w/encl. (1), 3-15000/6L-5264), dated 1 November 1966

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XVII - SCOUT S-150C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 49	LAUNCH TIME (LOCAL) 0456 PDT	LAUNCH DATE 28 October 1966	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE OV3-2	PAYLOAD WEIGHT LBS 200.5	MISSION TYPE 1966 97A	SCOUT MISSION TYPE NO 37	SUCCESS RATIO* 25/26 = 0.962

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 172.408	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 10	WIND SPEED, KNOTS 6
RELATIVE HUMIDITY % 92	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 54	BAROMETER, "HG 29.665

REMARKS

Hold of approximately 30 minutes caused by train passing through Range control area.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-35	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T/M Yes
FIRST-STAGE MOTOR ALGOL IIB, S/N 47	SECOND-STAGE MOTOR CASTOR II, S/N 27	THIRD-STAGE MOTOR X259-A3, S/N HPC-181	FOURTH-STAGE MOTOR FW-4S, S/N 30201

INSTRUMENTATION

1. Added spin bearing inner race temperature thermistor.
2. Added Base "A" Servo amplifier aft face temperature thermistor.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	887.6	868.2	-19.4 (-0.4 σ)
PERIGEE, N. MI.	178.7	176.4	-2.3 (-0.2 σ)
INCLINATION, DEG	82.11	81.98	-0.13 (-0.4 σ)
MAXIMUM VELOCITY FPS	--	--	--
ALTITUDE, N. MI.	--	--	--
SPIN RATE AT SEPARATION RPM	156.1	166.0	+9.9 (+6.3%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 177.0	3RD STAGE 18.20
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 33.3	3RD STAGE BOOST 5.00
2ND STAGE COAST 25.4	3RD STAGE COAST 0.20
	RETRO 11.80
SPIN BEARING TORQUE, IN-LBS 42.0	

TELEMETRY COVERAGE

1. Coverage of "D" and "E" section instrumentation was provided by SVAFB to 547 seconds and by Pt. Mugu from 11 to 571 seconds except for loss of signal from 180 to 185 seconds at both stations. Airborne coverage of "E" section was good only from 240 to 270 seconds; otherwise, it was of inferior quality to both SVAFB and Pt. Mugu stations from 214 to 492 seconds.
2. Intermittent signal level variations in 7.35 KC SCO caused "D" section transverse accelerometer channel to be inoperative until first-stage ignition (no loss of flight data resulted).

REMARKS AND/OR ANOMALIES

1. First Scout vehicle to incorporate 0.1-inch thick covering of cork insulation on Base "A" fins.
2. Third-stage roll anomaly during spin-up not detrimental to flight objective.
3. Third-stage small pitch motor apparently began to leak during third-stage coast.
4. SVAFB AN/FPS-16 radar provided data from 1 to 454 seconds; quality generally poor except for altitude parameter.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Report 3-30000/6R-32, dated 20 July 1966	TRANSMITTAL LETTER LTV Letter 3-15000/6L-4582, dated 27 July 1966
FINAL FLIGHT REPORT LTV Report 3-30000/7R-3, dated 23 January 1967	TRANSMITTAL LETTER LTV Letter 3-32000/7L-3019, dated 30 January 1967

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XVIII - SCOUT S-151C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 50	LAUNCH TIME (LOCAL) 0445 PST	LAUNCH DATE 31 January 1967	LAUNCH SITE SLC-5, SVAFB, Calif.	F
PAYLOAD TYPE OV3-5	PAYLOAD WEIGHT LBS 207.5	MISSION TYPE Orbital	SCOUT MISSION TYPE NO 38	SUCCESS RATIO* 25/27 = 0.926

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 182.131	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION DEG 260	WIND SPEED, KNOTS 8
RELATIVE HUMIDITY % 98	VISIBILITY, STATUTE MILES 6	TEMPERATURE, °F 53	BAROMETER, "HG 29.79

REMARKS

No problems of significance to the mission accomplishment were encountered.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A36	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T/M Yes
FIRST-STAGE MOTOR ALGOL IIB, S/N 42	2ND-STAGE MOTOR CASTOR II, S/N 29	3RD-STAGE MOTOR X259-A3, S/N HPC-184	FOURTH-STAGE MOTOR FW-4S, S/N 30204

INSTRUMENTATION

Added Base "A" Ambient Temperature (in line with Range-side fin) measurement to help determine if exhaust gases were flowing into Base "A" section.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	540.3	NOT AVAILABLE	--
PERIGEE, N. MI.	162.0		--
INCLINATION, DEG	90.05		--
MAXIMUM VELOCITY FPS	--		--
ALTITUDE, N. MI.	--		--
SPIN RATE AT SEPARATION RPM	153.8	168	14.2 (9.23 %)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 173.0	3RD STAGE 17.70
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 30.9	3RD STAGE BOOST 3.4
2ND STAGE COAST 15.7	3RD STAGE COAST
	RETRO 13.3
SPIN BEARING TORQUE, IN-LBS 36.4	

TELEMETRY COVERAGE

Good data coverage provided by airborne station from 292 seconds to 484 seconds for "D" section and to 420.5 seconds for "E" section instrumentation; USNS SAMPAN HITCH provided reliable coverage of "E" section instrumentation only from 387 to 397 seconds. Pt. Mugu "D" section coverage was satisfactory for performance evaluation but "E" section was noisy.

REMARKS AND/OR ANOMALIES

1. Fourth-stage motor ruptured at 420.431 seconds (17.219 seconds stage time) following failure of the graphite insert in the nozzle throat; vehicle performance was normal up to this time.
2. SVAFB AN/FPS-16 radar coverage provided from 0.1 to 513 seconds except for loss of signal from 421 to 474 seconds; considerable data scatter except in altitude parameter.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/6R-23, dtd 7 September 1967 w/Rev.A dtd 30 December 1966	TRANSMITTAL LETTER LTV Ltr. 3-15000/6L-4941 dtd 15 September 1966 and LTV Ltr. 3-32000/7L-3026 dtd 10 January 1967
FINAL FLIGHT REPORT LTV Report 3-30000/7R-7, dated 17 March 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-3298, dated 20 March 1967

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XIX - SCOUT S-152C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 55	LAUNCH TIME (LOCAL) 1906 PDT	LAUNCH DATE 29 May 1967	LAUNCH SITE SLC-5, SVAFB Calif.	F
PAYLOAD TYPE ESRO II	PAYLOAD WEIGHT LBS 162.5	MISSION TYPE Orbital	SCOUT MISSION TYPE NO 43	SUCCESS RATIO* 29/32 = 0.906

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 192.26	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION DEG 330	WIND SPEED, KNOTS 8
RELATIVE HUMIDITY % 82	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 53	BAROMETER, "HG 29.55

REMARKS

No problems of significance to the mission were encountered and no vehicle "holds" were experienced.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-40	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T M Yes
FIRST-STAGE MOTOR ALGOL IIB, S/N 49	SECOND-STAGE MOTOR CASTOR II, S/N 26	THIRD-STAGE MOTOR X259-A3, S/N HPC-151A	FOURTH-STAGE MOTOR FW-4S, S/N 30206

INSTRUMENTATION

"E" section had added probes to measure temperature of the FW-4S motor attachment flange and the motor case.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.			
PERIGEE, N. MI.			
INCLINATION, DEG			
MAXIMUM VELOCITY FPS			
ALTITUDE, N. MI.			
SPIN RATE AT SEPARATION RPM			

NOT APPLICABLE

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 179.5	3RD STAGE 18.7
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 27.7	3RD STAGE BOOST N/A
2ND STAGE COAST 23.8	3RD STAGE COAST N/A
	RETRO N/A
SPIN BEARING TORQUE, IN-LBS	

TELEMETRY COVERAGE

Telemetry data from South Vandenberg was received through T + 560 seconds. Pt. Mugu data was also available from T + 25 through T + 575 seconds with intermittent data from T + 320 to T + 575.

REMARKS AND OR ANOMALIES

The case of the X259-A3 ANTARES rocket motor burned through culminating in destructive termination at 201.54 seconds into the flight. Radar data from AN/FPS-16 radar South Vandenberg covered from T + 1.5 seconds to 564.7 seconds flight time.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/7R-4, Rev. A, dated 7 April 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-3435, dated 14 April 1967
FINAL FLIGHT REPORT LTV Rpt. 3-32000/7R-144, dated 4 August 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-412 (w/encl. (1) 3-32000/7L-3993), dated 10 August 1067

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XX - SCOUT S-153C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 52	LAUNCH TIME (LOCAL) 1006 GMT	LAUNCH DATE 26 April 1967	LAUNCH SITE Formosa Bay, Kenya, Africa, San Marco Platform S	
PAYLOAD TYPE SAN MARCO	PAYLOAD WEIGHT LBS 281.09	MISSION TYPE 1967 38A	SCOUT MISSION TYPE NO. 40	SUCCESS RA 27/ = 0.931

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 90	LAUNCH ELEVATION, DEG 90	WIND DIRECTION DEG 165	WIND SPEED, KNOTS 21
RELATIVE HUMIDITY, % 73	VISIBILITY, STATUTE MILES 18.4	TEMPERATURE, °F 81	BAROMETER, "HG 29.82

REMARKS

Blockhouse located on Santa Rita platform; vehicle launched from San Marco mobile platform. Both platforms located in Formosa Bay off the coast of Kenya, Africa. Launch conducted by the Italian Space Commission.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-43	SPIN MOTORS (2) 1.0KS40 and (2) 1.0KS75		"E" SECTION T M No
FIRST-STAGE MOTOR ALGOL II, S/N 46	SECOND-STAGE MOTOR CASTOR II, S/N 28	THIRD-STAGE MOTOR ANTARES X259-A3 S/N HPC-182	FOURTH-STAGE MOTOR FW-4S, S/N 30202

INSTRUMENTATION

"D" section Whittaker roll-stabilized free gyro installed with continuous channel output for Range Safety in lieu of "C" band tracking system since radar coverage was not available at this launch site.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	432.4	398.2	-40.23 (0.4 σ)	2ND STAGE 172	3RD STAGE 18.5
PERIGEE, N. MI.	117.0	113.2	-4.17 (0.4 σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	2.92	2.88	-0.037 (0.1 σ)	2ND STAGE BOOST 24.5	3RD STAGE BOOST 4.2
MAXIMUM VELOCITY FPS	26041.	25984.	57.05 (1.02σ)	2ND STAGE COAST 26.0	3RD STAGE COAST 0.5
ALTITUDE, N. MI.	117.13	116.6	0.53 (0.18 σ)		RETRO 12.3
SPIN RATE AT SEPARATION RPM	162.7	170.8	8.1 (4.98 %)	SPIN BEARING TORQUE, IN-LBS 312	

TELEMETRY COVERAGE

Santa Rita platform provided real time telemetry data display and magnetic tape recording through third-stage retro force command.

REMARKS AND/OR ANOMALIES

Longitudinal accelerometer inoperative prior to and during flight.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Report 3-30000/6R-26 dated 20 Oct. 1966 as revised by 3-30000/7R-8 dtd 10 April 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-3428, dated 12 April 1967
FINAL FLIGHT REPORT LTV Report 3-32000/8R-143 dated 15 August 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-4087, dated 15 August 1968

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXI - SCOUT S-154C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 51	LAUNCH TIME (LOCAL) 1925 PST	LAUNCH DATE 13 April 1967	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE N-10	PAYLOAD WEIGHT LBS 129	MISSION TYPE 1967 34A	SCOUT MISSION TYPE NO 39	SUCCESS RATIO* 26/28 = 0.929

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 182.204	LAUNCH ELEVATION, DEG 90	WIND DIRECTION, DEG 055	WIND SPEED, KNOTS 3
RELATIVE HUMIDITY % . 87	VISIBILITY, STATUTE MILES 15	TEMPERATURE, °F 49	BAROMETER, "HG 29.82

REMARKS

Normal - no problems of significance to the mission were encountered.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-37	SPIN MOTORS (2) 1.0KS40; (2) 0.6KS40		"E" SECTION T M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 51	SECOND-STAGE MOTOR CASTOR II, S/N 98	THIRD-STAGE MOTOR X259-A3, S/N HPC-163A	FOURTH-STAGE MOTOR X258-E6, S/N ABL-134

INSTRUMENTATION

No special instrumentation, not previously installed on Scout, was utilized on this vehicle

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	623.6	589.4	-34.2 (0.8 σ)	2ND STAGE 176	3RD STAGE 18
PERIGEE, N. MI.	578.2	571.1	-7.1 (0.3 σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	89.96	90.25	+0.29 (-- σ)	2ND STAGE BOOST 34.7	3RD STAGE BOOST 4.30
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST --	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 12.40
SPIN RATE AT SEPARATION RPM	159.9	166.7	+6.8 (4.25 %)	SPIN BEARING TORQUE, IN-LBS 34.00	

TELEMETRY COVERAGE

SVAFB provided coverage to 987 seconds although it was intermittent occasionally with some loss of data prior to 155 seconds and subsequent to 741 seconds. Pt. Mugu provided coverage from 15 seconds to 992 seconds and was occasionally intermittent prior to 110 seconds and subsequent to 894 seconds.

REMARKS AND OR ANOMALIES

1. First Scout for which launcher azimuth correction, calculated in the wind aiming procedure, was utilized.
2. First and third-stage chamber pressure measurements indicated abrupt decrease in pressure at 49.1 seconds (8 psi) and 125.2 seconds (9 psi); the latter returned to original level in 9.7 seconds - anomalies not a function of motor performance.
3. SVAFB AN/FPS-16 provided radar data from 16.29 to 306.69 seconds. SNI AN/FPS-16 provided radar data from 307.09 to 734.69 seconds. These data were satisfactory for post-flight analysis.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/7R-6, Rev. A, dated 4 April 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-3404, dated 7 April 1967
FINAL FLIGHT REPORT LTV Rpt. 3-32000/7R-155, dated 5 September 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-469 (w/encl. (1), 3-32000/7L-4128) dated 21 Sept. 1967

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXII - SCOUT S-155C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 53	LAUNCH TIME (LOCAL) 0900 PDT	LAUNCH DATE 5 May 1967	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE UK-E	PAYLOAD WEIGHT LBS 197.71	MISSION TYPE 1967 42A	SCOUT MISSION TYPE NO 41	SUCCESS RATIO* 28/30 = 0.933

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 169.92	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 340	WIND SPEED, KNOTS 5
RELATIVE HUMIDITY, % 78	VISIBILITY, STATUTE MILES 11.5	TEMPERATURE, °F 52	BAROMETER, "HG 29.780

REMARKS

Except for a below minimum frequency signal on the 10.5 KC T/M SCO, no problems were encountered during this countdown.

CONFIGURATION

HEAT SHIELD 34/-25,S/N 41	SPIN MOTORS (4) 1.0KS40		"E" SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 52	SECOND-STAGE MOTOR CASTOR II, S/N 100	THIRD-STAGE MOTOR X259-A3, S/N HIB-202	FOURTH-STAGE MOTOR X258-E6, S/N ABL-143

INSTRUMENTATION

Two additional thermistors installed, one to measure temperature of the support near the tracking beacon and the other the support near the telemetry transmitter.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	294.3	330.0	+35.7 (0.9 σ)
PERIGEE, N. MI.	280.0	273.9	-6.1 (0.2 σ)
INCLINATION, DEG	80.0	80.17	+0.17 (0.5 σ)
MAXIMUM VELOCITY FPS	--	--	--
ALTITUDE, N. MI.	--	--	--
SPIN RATE AT SEPARATION RPM	146.2	154.4	+8.2 (5.6 %)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 174.5	3RD STAGE 18.2
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 35.1	3RD STAGE BOOST 6.39
2ND STAGE COAST 13.9	3RD STAGE COAST --
	RETRO 10.8
SPIN BEARING TORQUE, IN-LBS 25.00	

TELEMETRY COVERAGE

SVAFB provided coverage to 622 seconds except for intermittent data from 111 to 118 seconds, 140 to 152 seconds, 557 to 558 seconds and loss of data from 152 to 173 seconds. Pt. Mugu provided coverage from 13 to 643 seconds except for intermittent data from 110 to 117 and 601 to 643 seconds. SNI provided coverage from 7 to 601 seconds except that data was intermittent briefly at 558 seconds and for the period subsequent to 585 seconds.

REMARKS AND/OR ANOMALIES

1. SVAFB AN/FPS-16 provided radar data from 0.15 to 560.15 seconds.
2. First and third-stage chamber pressure measurements indicated abrupt decreases in pressure at 49.9 seconds (19 psi) and 147.9 seconds (13 psi), respectively; the latter returned to normal in 7 seconds - anomalies not a function of motor performance.
3. IRIG channel 12 frequency below minimum; 10.5 KC normal accelerometer data invalid for flight.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Report 3-30000/7R-5, dated 28 February 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-3220, dated 7 March 1967
FINAL FLIGHT REPORT LTV Report 3-32000/7R-148, dated 21 August 1967	TRANSMITTAL LETTER LTV Ltr. 3-32000/7L-4046, dated 25 August 1967

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXIII - SCOUT S-156C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 54	LAUNCH TIME (LOCAL) 0205 PDT	LAUNCH DATE 18 May 1967	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE N-11	PAYLOAD WEIGHT LBS 129	MISSION TYPE 1967 48A	SCOUT MISSION TYPE NO 42	SUCCESS RATIO* 29/31 = 0.935

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 181.94	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG --	WIND SPEED, KNOTS 0
RELATIVE HUMIDITY % 100	VISIBILITY, STATUTE MILES 1/8	TEMPERATURE, °F 53	BAROMETER, "HG 29.815

REMARKS

Normal; vehicle launched on first countdown - no problems of significance to the mission were encountered.

CONFIGURATION

HEAT SHIELD 34/-25, S/N 39	SPIN MOTORS (2) 1.0KS40; (2) 0.6KS40		"E" SECTION T.M. No
FIRST-STAGE MOTOR ALGOL IIB, S/N 56	SECOND-STAGE MOTOR CASTOR II, S/N 102	THIRD-STAGE MOTOR X259-A3, S/N HIB-201	FOURTH-STAGE MOTOR X258-E6, S/N ABL-139

INSTRUMENTATION

Standard coverage.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	631.5	600.5	-31.0 (0.74 σ)	2ND STAGE 176.5	3RD STAGE 18.9
PERIGEE, N. MI.	583.5	584.5	+0.5 (0.02 σ)	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	90.0	89.58	-0.42 (1.30 σ)	2ND STAGE BOOST 36.0	3RD STAGE BOOST 3.22
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST 1.2	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 13.3
SPIN RATE AT SEPARATION RPM	159.5	162.8	+3.3 (2.07 %)	SPIN BEARING TORQUE, IN-LBS 37.6	

TELEMETRY COVERAGE

SVAFB coverage to 981 seconds although intermittent occasionally with some loss of data prior to 155 seconds and subsequent to 737 seconds; Pt. Mugu coverage from 12 to 1110 seconds, briefly intermittent at 104 to 107 seconds and intermittent subsequent to 737 seconds; SNI coverage from 3 to 1037 seconds, briefly intermittent at 25 to 30 seconds and intermittent with several periods of data loss subsequent to 737 seconds. Satisfactory coverage was available from one or more of these sources from lift-off to 737 seconds.

REMARKS AND/OR ANOMALIES

1. SVAFB AN/FPS-16 provided radar coverage from 0.41 to 744 seconds.
2. Third-stage chamber pressure indication experienced abrupt decrease of 31 psi at 126.41 seconds and returned to normal about seven seconds later - not a function of motor performance.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Report 3-30000/7R-9, dated 18 April 1967	TRANSMITTAL LETTER LTV Letter 3-32000/7L-3489, dated 24 April 1967
FINAL FLIGHT REPORT LTV Report 3-32000/7R-182, dated 23 October 1967	TRANSMITTAL LETTER LTV Letter 3-32000/7L-546 (w/encl. (1),3-32000/7L-4325)dtd 26 Oct. 1967

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXIV - SCOUT S-157C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 56	LAUNCH TIME (LOCAL) 0125 PDT	LAUNCH DATE 25 September '67	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE N-12	PAYLOAD WEIGHT LBS 132	MISSION TYPE 1967 92A	SCOUT MISSION TYPE NO. 44	SUCCESS RATIO* 30/33 = 0.909

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 181.952	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 0	WIND SPEED, KNOTS 10
RELATIVE HUMIDITY % 97	VISIBILITY, STATUTE MILES 9	TEMPERATURE, °F 60	BAROMETER, "HG 29.57

REMARKS

Countdown No. 1 (on 20 September) was scrubbed prior to Task 4 due to thunderstorms in the area. Countdown No. 2 (on 22 September) was scrubbed during Task 1 due to a design defect in the vehicle "B" and "C" sections 3/16" N_2 pressure switch lines. Countdown No. 3 (started on 24 September) was normal and proceeded to lift-off without difficulty.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-42R	SPIN MOTORS (2) 1.0KS40; (2) 0.6KS40		"E" SECTION T.M. No
FIRST-STAGE MOTOR ALGOL IIB, S/N 53	SECOND-STAGE MOTOR CASTOR II, S/N 96	THIRD-STAGE MOTOR X259-B3 S/N HIB-220	FOURTH-STAGE MOTOR X258-E6 S/N ABL-135

INSTRUMENTATION

No special instrumentation previously unused on Scout was utilized on this vehicle.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	623.1	607.2	-15.9
PERIGEE, N. MI.	566.4	566.8	+0.5
INCLINATION, DEG	90.0	89.3	-0.7
MAXIMUM VELOCITY FPS	--	--	--
ALTITUDE, N. MI.	--	--	--
SPIN RATE AT SEPARATION RPM	159.5	163.1	+3.6 (+2.3%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 178	3RD STAGE 18.7
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 32.9	3RD STAGE BOOST 4.3
2ND STAGE COAST 1.4	3RD STAGE COAST --
	RETRO 12.0
SPIN BEARING TORQUE, IN-LBS 32.4	

TELEMETRY COVERAGE

SVAFB provided coverage to 788 seconds although it was intermittent from 100 to 114 and from 124 to 129 seconds; loss of data was experienced from 129 to 155, 732 to 734, and 740 to 777 seconds (considered primary data source for first-stage performance). Point Mugu provided coverage from 11 to 992 seconds and was intermittent from 103 to 112 and from 790 to 802 seconds (considered primary data source for second and third-stage performance).

REMARKS AND OR ANOMALIES

1. Roll rate gyro indicated a partial malfunction during latter portion of 2nd and 3rd-stage boost (considered random anomaly) when longitudinal acceleration exceeded 6 "g"; roll rate oscillation occurred for seven seconds during 3rd-stage boost with no apparent external disturbance.
2. Investigation of effect of 0.1" cork insulation on Base "A" fins to reduce orbital inclination error.
3. First and third-stage chamber pressure indication anomalies experienced (considered unrelated).
4. SVAFB AN/FPS-16 provided radar data to 728 seconds (off track from 278 to 309 and 484 to 526 seconds); azimuth, flight path angle, altitude and velocity data in error during significant portions of flight.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/7R-11 dated 17 July 1967 w/Rev. A dated 1 September and Rev. B dtd 8 Sept. 1967	TRANSMITTAL LETTER LTV Ltrs. 3-32000/7L -3895, -4123 and -4130 dated 24 July, 11 September and 11 September 1967, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-13 dated 15 January 1968 w/Appendix C dated 23 February 1968.	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L -3095 and -3360 dated 23 January and 1 March 1968, respectively.

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXV - SCOUT S-158C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 58	LAUNCH TIME (LOCAL) 1703 PST	LAUNCH DATE 4 December 1967	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE OV3-6	PAYLOAD WEIGHT LBS 222	MISSION TYPE 1967 120A	SCOUT MISSION TYPE NO 45	SUCCESS RATIO* 32/35 = 0.915

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 182.29	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 140	WIND SPEED, KNOTS 2
RELATIVE HUMIDITY, % 88	VISIBILITY, STATUTE MILES 23	TEMPERATURE, °F 56	BAROMETER, "HG 29.73

REMARKS

Countdown normal except for interruption during Task 3 to perform leak checks on "B" section lower right roll motor of reaction control system; no further malfunction was observed and countdown was resumed followed by check of this motor during "burp" checks of reaction control motors prior to launch; performance was satisfactory and the terminal countdown was completed approximately 63 minutes behind schedule.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-38	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T/M Yes
FIRST-STAGE MOTOR ALGOL IIB, S/N 57	SECOND-STAGE MOTOR CASTOR II, S/N 105	THIRD-STAGE MOTOR X259-B3 S/N HIB-212	FOURTH-STAGE MOTOR FW-4S S/N 30210

INSTRUMENTATION

Standard "D" and "E" section telemetry instrumentation.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	244.4	241.2	-3.2	2ND STAGE 172.5	3RD STAGE 18.1
PERIGEE, N. MI.	233.1	225.2	-7.9	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	90.00	90.66	+0.66	2ND STAGE BOOST 26.5	3RD STAGE BOOST 5.5
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST 14.4	3RD STAGE COAST 1.0
ALTITUDE, N. MI.	--	--	--		RETRO 10.6
SPIN RATE AT SEPARATION RPM	167.5	168.2	+0.7 (+0.4 %)	SPIN BEARING TORQUE, IN-LBS 48.0	

TELEMETRY COVERAGE

SVAFB and Point Mugu provided coverage to 641 seconds, airborne from 154 to 847 and downrange ship from 264 to 864 with complete coverage to 750 seconds from one or more sources for "D" section T/M. SVAFB and Point Mugu provided coverage to 590 and 603, respectively, airborne from 264 to 650 and downrange ship from 269 to 921 with complete coverage to 491 seconds by one or more sources for "E" section T/M; subsequent to this time, coverage was occasionally intermittent with some periods experiencing loss of data.

REMARKS AND OR ANOMALIES

1. Disturbances noted on accelerometers during third and fourth-stage coast periods attributed to cracking of the motor nozzle exit cone liner.
2. SVAFB AN/FPS-16 provided radar coverage from lift-off to 495 seconds with data being good to 220 seconds and with all parameters being in error subsequent to that time.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/7R-190 dated 30 October 1967 w/Rev. A dated 15 November and Rev. B dtd 28 Nov. 1967.	TRANSMITTAL LETTER LTV Ltrs. 3-32000/7L -4403, -4473, -4495 and -4527 dated 3 November, 17 November, 27 November and 30 November 1967, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-83 dated 6 May 1968 w/Rev. A pages dated 6 August 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L -3677 and -4132 dated 10 May and 27 August 1968, respectively.

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXVI - SCOUT S-159C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 57	LAUNCH TIME (LOCAL) 1333 EDT	LAUNCH DATE 19 October 1967	LAUNCH SITE Mark II Launcher Wallops Island, Va.	S
PAYLOAD TYPE RAM C-A	PAYLOAD WEIGHT LBS 302	MISSION TYPE Re-entry	SCOUT MISSION TYPE NO. 8	SUCCESS RATIO* 31/34 = 0.912

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 109.08	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 280	WIND SPEED, KNOTS 16
RELATIVE HUMIDITY, % 53	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 57	BAROMETER, "HG 29.896

REMARKS

Countdown No. 1 (on 13 October) terminated during Task 4 due to suspected payload problems. Countdown No. 2 (on 18 October) cancelled prior to starting Task 4 due to local weather conditions. Countdown No. 3 (on 19 October) experienced holds during Task 5 (remove wind correction), at T - 14 minutes (downrange support problems), during Sequencer run (faulty trip relay); recycled to T - 6 minutes twice and then after another hold (downrange support problems) proceeded to lift-off with no difficulties.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-25	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 54	SECOND-STAGE MOTOR CASTOR II, S/N 101	THIRD-STAGE MOTOR X259-A3 S/N HIB-205	FOURTH-STAGE MOTOR FW-4S S/N 30207

INSTRUMENTATION

Standard "D" section T/M instrumentation.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	--	--	--
PERIGEE, N. MI.	--	--	--
INCLINATION, DEG	--	--	--
MAXIMUM VELOCITY FPS (Re-entry)	25026	24860	-166
ALTITUDE, N. MI.	74.64	75.91	+1.27
SPIN RATE AT SEPARATION RPM	177.1	173.5	-3.6 (-2.0 %)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 161	3RD STAGE 17.9
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 27.8	3RD STAGE BOOST 2.1
2ND STAGE COAST 27.5	3RD STAGE COAST --
	RETRO 14.2
SPIN BEARING TORQUE, IN-LBS 38.2	

TELEMETRY COVERAGE

Wallops Island provided coverage to 414 seconds with intermittent data between 103 and 115, 410 and 414, and loss of data from 115 to 120 seconds; Coquina Beach provided coverage from 23 to 414 seconds with intermittent data from 110 to 119 and from 410 to 414 seconds; Bermuda provided coverage from 123 to 420 seconds with a period of intermittent data from 413 seconds to loss of signal.

REMARKS AND/OR ANOMALIES

1. All vehicle systems performed normally.
2. First Scout vehicle to use modified 2nd and 3rd-stage body bending filter in the control system.
3. Wallops Island AN/FPS-16, AN/FPQ-6 and SPANDAR provided radar coverage from 1 to 336, 1 to 337, and 29 to 384 seconds, respectively; Bermuda AN/FPS-16 and AN/FPQ-6 provided radar coverage from 132 to 474 and 257 to 507 seconds, respectively.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-30000/7R-10 dated 8 May 1967 w/Rev. A dated 3 October 1967	TRANSMITTAL LETTER LTV Ltrs. 3-32000/7L-3570 and -4250 dated 17 May and 10 October 1967, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-46 dated 29 February 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-3396 dated 8 March 1968

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXVII - SCOUT S-160C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 60	LAUNCH TIME (LOCAL) 1328 EST	LAUNCH DATE 5 March 1968	LAUNCH SITE Mark II Launcher Wallops Island, Va.	S
PAYLOAD TYPE SOLRAD	PAYLOAD WEIGHT LBS 197	MISSION TYPE 1968 17A	SCOUT MISSION TYPE NO 47	SUCCESS RATIO* 34/37 = 0.919

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 129.00	LAUNCH ELEVATION, DEG 89.96	WIND DIRECTION DEG 294	WIND SPEED, KNOTS 11
RELATIVE HUMIDITY % 25	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 53	BAROMETER, "HG 29.804

REMARKS

Countdown No. 1 (on 29 February) cancelled during Task 4 due to weather. Countdown No. 2 (on 3 March) cancelled during Task 3 due to excessive winds aloft. During Countdown No. 3 (on 5 March) two holds were called during Task 2, two during Task 4 and one during Task 7; the count then proceeded to lift-off without difficulty.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-46	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 62	SECOND-STAGE MOTOR CASTOR II, S/N 97	THIRD-STAGE MOTOR X259-B3 S/N HIB-206	FOURTH-STAGE MOTOR FW-4S S/N 2218-8

INSTRUMENTATION

1. Standard "D" section T/M instrumentation.
2. Third-stage chamber pressure measurement indicated abrupt decrease at 10 seconds stage time and lasted for four seconds.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	469.9	481.7	+11.8	2ND STAGE 174.0	3RD STAGE 18.8
PERIGEE, N. MI.	463.4	279.9	-183.5	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	60.00	59.41	-0.59	2ND STAGE BOOST 32.6	3RD STAGE BOOST 3.7
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST 1.3	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 13.4
SPIN RATE AT SEPARATION RPM	162.5	166.9	+4.4 (+2.7%)	SPIN BEARING TORQUE, IN-LBS 53.1	

TELEMETRY COVERAGE

Wallops Island provided coverage to 869 seconds with a period of intermittent data from 107 to 113 and loss of data from 142 to 157 seconds; Bermuda provided satisfactory coverage from 120 to 1020 seconds with no dropouts of significance.

REMARKS AND OR ANOMALIES

1. Pair of dummy launch fitting fairings bonded on Base "A" to aid in determining aerodynamic pitching moment not evaluated; nose-right yaw torquing maneuver prior to fourth-stage ignition satisfactory.
2. Disturbances were noted in first-stage operation beginning as early as 9 seconds; culminated in failure of the ALGOL IIB nozzle RVA graphite insert at 32.5 seconds; resulting 25%-drop in thrust level partially compensated for by 5-second increase in web burn time. (See LTV Report 3-32000/8R-60 dated 25 October 1968)
3. Wallops Island AN/FPQ-6 provided radar coverage to 661 seconds (data good to 300 seconds except path angle, altitude after 300 seconds, and fluctuations in all parameters after 400 seconds); Bermuda AN/FPQ-6 provided radar data from 162 to 701 seconds but was unacceptable since relative velocity, path angle and azimuth were not available. Neither set of radar data considered valid at fourth-stage ignition.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/8R-19 dated 23 January 1968 w/Rev. A dtd 23 February 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L-3216 and -3330 dated 30 January and 26 February 1968, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-100 dated 24 May 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-3793 dated 21 June 1968

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXVIII - SCOUT S-161C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 62	LAUNCH TIME (LOCAL) 1906 PDT	LAUNCH DATE 16 May 1968	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE ESRO II-B	PAYLOAD WEIGHT LBS 164	MISSION TYPE 1968 41A	SCOUT MISSION TYPE NO 48	SUCCESS RATIO* 36/39 = 0.923

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 192.143	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION DEG 010	WIND SPEED, KNOTS 7
RELATIVE HUMIDITY, % 86	VISIBILITY, STATUTE MILES 8	TEMPERATURE, °F 53	BAROMETER, "HG 29.715

REMARKS

Countdown normal; wind aiming correction of 0.20 deg made in the launch azimuth.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-49	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T/M Yes
FIRST-STAGE MOTOR ALGOL IIB, S/N 59	SECOND-STAGE MOTOR CASTOR II, S/N 103	THIRD-STAGE MOTOR X259-B3 S/N HIB-207	FOURTH-STAGE MOTOR FW-4S S/N 2218-10

INSTRUMENTATION

Standard "D" section and "E" section T/M instrumentation except lower "D" structure temperature replaced lower "D" ambient temperature measurement for this vehicle only; also, vibrometer added to aft flange of third-stage motor and high frequency response accelerometers added to "D" and "E" section T/M systems.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	599.1	587.1	-12.0
PERIGEE, N. MI.	191.3	182.9	-8.4
INCLINATION, DEG	98.20	97.20	-1.00
MAXIMUM VELOCITY FPS	--	--	--
ALTITUDE, N. MI.	--	--	--
SPIN RATE AT SEPARATION RPM	170.0	171.6	+1.6 (+0.9 %)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 174.5	3RD STAGE 17.9
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 26.1	3RD STAGE BOOST 5.3
2ND STAGE COAST 26.0	3RD STAGE COAST --
	RETRO 11.0
SPIN BEARING TORQUE, IN-LBS 77	

TELEMETRY COVERAGE

SVAFB provided T/M coverage to 538 and 517, Point Mugu from 18 to 573 and 12 to 540, San Nicholas Island from 13 to 607 and 13 to 540, and the downrange ship from 250 to 715 and 238 to 321 seconds for "D" and "E" sections T/M, respectively. Coverage for "D" section was continuous from one or more sources to 573 seconds except for brief periods from 105 to 111 and 514 to 517 seconds; coverage for "E" section was continuous from one or more sources to 534 seconds except for the period from 410 to 442 seconds where coverage was intermittent.

REMARKS AND/OR ANOMALIES

1. Dummy launch fitting fairings bonded to Base "A" provided data for evaluation of aerodynamic pitching moment coefficient at zero angle-of-attack.
2. Both high frequency response accelerometers malfunctioned and the third-stage chamber pressure measurement indication anomaly occurred from 13 to 17 seconds stage time.
3. Disturbances noted during fourth-stage coast and roll motion anomaly experienced at fourth-stage spin-up (did not compromise mission success).
4. SVAFB AN/TPQ-18 provided skin tracking radar coverage to 65 seconds; SVAFB AN/FPS-16 provided beacon tracking radar coverage from 57 to 558 seconds. Both sets of data were of good quality.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/8R-78 dated 22 April 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-3585 dated 23 April 1968
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-156 dated 30 August 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-4234 dated 12 September 1968

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXIX - SCOUT S-162C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 59	LAUNCH TIME (LOCAL) 2055 PST	LAUNCH DATE 1 March 1968	LAUNCH SITE SLC-5, SVAFB, Calif.	S
PAYLOAD TYPE N-13	PAYLOAD WEIGHT LBS 132	MISSION TYPE 1968 12A	SCOUT MISSION TYPE NO 46	SUCCESS RATIO* 33/36 = 0.917

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 181.954	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 090	WIND SPEED, KNOTS 8
RELATIVE HUMIDITY, % 80	VISIBILITY, STATUTE MILES 11.5	TEMPERATURE, °F 55	BAROMETER, "HG 29.515

REMARKS

Countdown normal.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-44	SPIN MOTORS (2) 0.6KS40; (2) 1.0KS40		"E" SECTION T M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 58	SECOND-STAGE MOTOR CASTOR II, S/N 170	THIRD-STAGE MOTOR X259-B3 S/N HIB-213	FOURTH-STAGE MOTOR X258-E5 S/N ABL-145

INSTRUMENTATION

Standard "D" section T/M instrumentation installed.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	645.3	621.2	-24.1	2ND STAGE 171.6	3RD STAGE 17.1
PERIGEE, N. MI.	582.3	560.8	-21.5	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	90.00	89.98	-0.02	2ND STAGE BOOST 29.1	3RD STAGE BOOST 4.2
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST 9.5	3RD STAGE COAST --
ALTITUDE, N. M.	--	--	--		RETRO 9.8
SPIN RATE AT SEPARATION RPM	171.1	169.2	-1.9 (-1.1 %)	SPIN BEARING TORQUE, IN-LBS 45.8	

TELEMETRY COVERAGE

SVAFB provided T/M coverage to 973 seconds; intermittent data was received from 102 to 112 and 757 to 774 seconds with loss of data experienced from 132 to 157 seconds. Point Mugu provided T/M coverage from 15 to 864 seconds with intermittent periods from 103 to 110 and loss of data from 730 to 864 seconds. Satisfactory data could be extracted from one or more sources throughout the flight.

REMARKS AND OR ANOMALIES

1. Pair of dummy launch fitting fairings bonded to Base "A" in a mirror image position with respect to the standard launch fitting fairings; first Scout vehicle to provide comparison data for evaluation of effect of fairings on aerodynamic pitching moment coefficient at zero angle-of-attack.
2. Third-stage chamber pressure measurement indication experienced 59-psi drop at 8 seconds stage time for approximately two seconds.
3. SVAFB AN/FPS-16 provided radar coverage to 740 seconds although a data discontinuity occurred between 517 and 527 seconds; path angle data appeared to be low after second-stage burnout and did not correlate with velocity and altitude; also, altitude data did not correlate with injection altitude obtained from satellite orbital data.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/8R-42 dated 23 February 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-3329 dated 26 February 1968
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-132 dated 12 July 1968 as revised 9 August 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L -3988 and -4133 dated 19 July and 23 August 1968, respectively.

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXX - SCOUT S-163CR POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 77	LAUNCH TIME (LOCAL) 0552:00.06 GMT	LAUNCH DATE 15 November 1971	LAUNCH SITE Formosa Bay, Kenya, Africa, San Marco Platform
PAYLOAD TYPE San Marco	PAYLOAD WEIGHT LBS 113.40	MISSION TYPE CRA-A (SSS-A)	SCOUT MISSION TYPE NO 59
SUCCESS RATIO* 51/54 = 0.944			

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 86.90	LAUNCH ELEVATION, DEG 90.43	WIND DIRECTION, DEG 72	WIND SPEED, KNOTS 5.2
RELATIVE HUMIDITY %	VISIBILITY, STATUTE MILES 12.4	TEMPERATURE, °F 81	BAROMETER, "HG 30.115
REMARKS			

CONFIGURATION

HEAT SHIELD 34/-40 S/N A-400	SPIN MOTORS (2) 1.0KS40, (2) 0.6KS40		"E" SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 69	SECOND-STAGE MOTOR CASTOR II, S/N 178	THIRD-STAGE MOTOR X-259-B3, S/N HIB-305	FOURTH-STAGE MOTOR FW-4S S/N 2223-16
INSTRUMENTATION Standard "D" section T/M instrumentation			

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	15433.2	14531.5	-901.7
PERIGEE, N. MI.	120.1	119.3	- 0.8
INCLINATION, DEG	3.5	3.6	+ 0.1
MAXIMUM VELOCITY FPS	33069.0	32941.0	-128.0
ALTITUDE, N. MI.	120.13	119.62	- 0.49
SPIN RATE AT SEPARATION RPM	126.1	136.4	+ 10.3 (%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE	3RD STAGE
109.8	18.7

H_2O_2 CONSUMED, LBS	
2ND-STAGE BOOST 37.8	3RD-STAGE BOOST 3.4
2ND-STAGE COAST 22.8	3RD-STAGE COAST - -
	RETRO 14.3

SPIN BEARING TORQUE, IN-LBS
34.2

TELEMETRY COVERAGE

REMARKS AND/OR ANOMALIES

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rept. 3-34100/1R-40, dated 5 October 1971 with Revision dated 18 October 1971	TRANSMITTAL LETTER LTV 3-34100/1L-4107, dated 8 October 1971 and revision LTV 3-34100/1L-4146, dated 20 October 1971
FINAL FLIGHT REPORT LTV Rept. 3-34100/2R-28 dated 24 May 1972	TRANSMITTAL LETTER LTV 3-34100/2L-3549, dated 6 June 1972

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXXI - SCOUT S-164C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 61	LAUNCH TIME (LOCAL) 0019 EST	LAUNCH DATE 27 April 1968	LAUNCH SITE Mark II Launcher Wallops Island, Va.	S

PAYLOAD TYPE Re-Entry F	PAYLOAD WEIGHT LBS 600	MISSION TYPE Re-entry	SCOUT MISSION TYPE NO 9	SUCCESS RATIO* 35/38 = 0.921

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 109.658	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 165	WIND SPEED, KNOTS 11
RELATIVE HUMIDITY, % 86	VISIBILITY, STATUTE MILES 7	TEMPERATURE, °F 55	BAROMETER, "HG 29.975

REMARKS

Vehicle countdown started at 1400 hours on 26 April; eight holds were experienced to allow the guidance pre-heat to cycle, to allow the guidance system time to stabilize, for inspection of fin actuators and torquing of return line "B" nut, for re-inspection of the return line "B" nut, to correct launcher response to "up" command, to allow wind aiming correction on launch azimuth (+0.658 deg), re-install spacecraft umbilical, and for a brief Range hold. Lift-off was approximately 3 hours and 34 minutes behind schedule.

CONFIGURATION

HEAT SHIELD Non-standard	SPIN MOTORS (2) 0.6KS40	"E" SECTION T/M No

FIRST-STAGE MOTOR ALGOL IIB, S/N 65	SECOND-STAGE MOTOR CASTOR II, S/N 174	THIRD-STAGE MOTOR X259-B3 S/N HIB-209	FOURTH-STAGE MOTOR None (3-stage vehicle)

INSTRUMENTATION

1. Standard "D" section T/M instrumention installed.
2. Third-stage chamber pressure measurement indicated abrupt 110-psi drop at approximately 6 seconds stage time and returned to normal at about 28 seconds.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	--	--	--
PERIGEE, N. MI.	--	--	--
INCLINATION, DEG	--	--	--
MAXIMUM VELOCITY, FPS (Re-entry)	19750	19570	-180
ALTITUDE, N. MI.	49.13	51.67	+2.54
SPIN RATE AT SEPARATION RPM	52.0	60.7	+8.7 (+16.7%)

H_2O_2 ON BOARD AT LIFT OFF LBS

2ND STAGE	3RD STAGE
185.5	18.3

H_2O_2 CONSUMED, LBS

2ND STAGE BOOST 30.6	3RD STAGE BOOST 5.3
2ND STAGE COAST 79.4	3RD STAGE COAST --
	RETRO 11.7

SPIN BEARING TORQUE, IN-LBS: N/A

TELEMETRY COVERAGE

Wallops Island provided good T/M coverage to 429 seconds except for intermittent data from 112 to 122 seconds; Bermuda provided good T/M coverage from 121 to 430 seconds (loss of signal at re-entry).

REMARKS AND/OR ANOMALIES

1. First Scout vehicle launched after incorporation of FY'67 S^3T and SLC GSE modifications.
2. Thermal insulation added to second stage because of extended coast period.
3. Payload mounted on special "D" section configuration.
4. Two possible disturbances on roll rate trace during payload spin-up in apparent response to event monitor pulses probably caused by "snorts" in the ignitor squibs.
5. Exceptionally good quality radar coverage provided by Wallops Island AN/FPQ-6 and AN/FPS-16 from 1 to 420 seconds, Wallops Island MPS-19 from 16 to 444 seconds and Bermuda AN/FPQ-6 and AN/FPS-16 from 272 to 740 and 272 to 455 seconds, respectively.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/8R-50 dated 8 March 1968 w/Rev. A dated 18 April 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L -3423 and -3572 dated 15 March and 19 April 1968, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-141 dated 30 July 1968 w/revision pages dated 15 August 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L -4058 and -4131 dated 9 August and 23 August 1968, respectively.

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXXII - SCOUT S-165C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 63	LAUNCH TIME (LOCAL) 1312 PDT	LAUNCH DATE 8 August 1968	LAUNCH SITE SLC-5, VAFB, Calif.	S
PAYLOAD TYPE AD EXPLORER 39 I-C EXPLORER 40	PAYLOAD WEIGHT LBS 21 157	MISSION TYPE 1968 66A 1968 66B	SCOUT MISSION TYPE NO 49	SUCCESS RATIO* 37/40 = 0.925

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 170.868	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION DEG 270	WIND SPEED, KNOTS 5
RELATIVE HUMIDITY, % 69	VISIBILITY, STATUTE MILES 7	TEMPERATURE, °F 65	BAROMETER, "HG 29.805

REMARKS

Countdown was begun at 0544 hours on 8 August and proceeded normally to Task 5, where a 55-minute hold was called for the purpose of adjusting the payload umbilical door; the count then proceeded uninterrupted to lift-off.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-47	SPIN MOTORS (2) 1.0KS75; (2) 0.6KS40		"E" SECTION T/M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 73	SECOND-STAGE MOTOR CASTOR II, S/N 172	THIRD-STAGE MOTOR X259-B3 S/N HIB-215	FOURTH-STAGE MOTOR FW-4S S/N 2223-4

INSTRUMENTATION

Standard "D" section T/M instrumentation installed.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	1320.1	1372.5	+52.4	2ND STAGE 182.5	3RD STAGE 18.6
PERIGEE, N. MI.	377.0	371.4	-5.6	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	81.99	80.67	-1.32	2ND STAGE BOOST 39.5	3RD STAGE BOOST 4.6
MAXIMUM VELOCITY, FPS	--	--	--	2ND STAGE COAST 3.5	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 10.8
SPIN RATE AT SEPARATION RPM	155.7	162.7	+7.0 (+4.5%)	SPIN BEARING TORQUE, IN-LBS 70	

TELEMETRY COVERAGE

SVAFB provided T/M coverage to 750 seconds with intermittent data from 105 to 112 and 130 to 140, and loss of signal from 143 to 154 and 650 to 675 seconds; Point Mugu provided T/M coverage from 10 to 808 seconds with intermittent periods from 109 to 112 and 652 to 655 seconds with loss of signal from 792 to 803 seconds. San Nicholas Island provided T/M coverage (inferior in quality to SVAFB and Point Mugu) from 17 to 790 seconds with intermittent data from 105 to 112 and numerous intermittent periods and loss of data subsequent to 528 seconds.

REMARKS AND/OR ANOMALIES

1. First Scout vehicle to incorporate reworked ALGOL IIB nozzle and insulated ignitor as a result of vehicle S-160C first-stage anomaly.
2. Guidance system provided satisfactory yaw torquing maneuver during third-stage coast.
3. Third-stage chamber pressure measurement indication dropped at 13 seconds stage time accompanied by (first time) drop in pitch program voltage monitor measurement.
4. Second stage ignited at a dynamic pressure of 56 psf (usual limit is 40 psf); results satisfactory.
5. SVAFB AN/FPS-16 provided radar coverage to 616 seconds; relative flight azimuth data was not considered good until after 40 seconds and flight path angle appeared to be geodetic and not geocentric as labelled.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/8R-126 dated 8 July 1968 w/Rev. A dated 2 August 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L -3969 and -4056 dated 17 July and 8 August 1968, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-190 dated 18 October 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-4513 dated 24 October 1968

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXXIII - SCOUT S-166C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 76	LAUNCH TIME (LOCAL) 1931:00.18 EDT	LAUNCH DATE 20 September 1971	LAUNCH SITE Mark II Launcher Wallops Island, Va.

PAYLOAD TYPE GRP-A (BIC)	PAYLOAD WEIGHT LBS 70.50	MISSION TYPE Probe	SCOUT MISSION TYPE NO 6	SUCCESS RATIO* 50/53 = 0.943

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 109.32	LAUNCH ELEVATION, DEG 89.92	WIND DIRECTION, DEG 170	WIND SPEED, KNOTS 6
RELATIVE HUMIDITY % 75	VISIBILITY, STATUTE MILES 4	TEMPERATURE, °F	BAROMETER, "HG 30.08

REMARKS

CONFIGURATION

HEAT SHIELD 34/-25 S/N A-58	SPIN MOTORS (2) 1.0KS40; (2) 0.6KS40	"E" SECTION T/M No

FIRST-STAGE MOTOR ALGOL IIC, S/N 71	SECOND-STAGE MOTOR CASTOR II, S/N 183	THIRD-STAGE MOTOR A-259-B3 S/N HIB-301	FOURTH-STAGE MOTOR FW-4S S/N 2223-11

INSTRUMENTATION

Standard "D" section T/M instrumentation

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	- -	- -	- -
PERIGEE, N. MI.	- -	- -	- -
INCLINATION, DEG	- -	- -	- -
MAXIMUM VELOCITY FPS	31451.	31337.	-114.0
ALTITUDE, N. MI.	294.33	298.33	+ 4.0
SPIN RATE AT SEPARATION RPM	155.8	166.0	+10.2 (%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 176.5	3RD STAGE 19.1
H_2O_2 CONSUMED, LBS	
2ND-STAGE BOOST 27.5	3RD-STAGE BOOST 3.85
2ND-STAGE COAST 12.0	3RD-STAGE COAST .25
	RETRO 14.1
SPIN BEARING TORQUE, IN-LBS 43.4	

TELEMETRY COVERAGE

REMARKS AND/OR ANOMALIES

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rept. 3-34100/1R-16 dated 18 March 1971 with Rev. B dated 21 April 1971	TRANSMITTAL LETTER LTV 3-34100/1L-3299, dated 19 March 1971, Revision: LTV 3-34100/1L-3442, dated 5 May 1971
FINAL FLIGHT REPORT LTV Rept. 3-34100/2R-20, dated 7 April 1972	TRANSMITTAL LETTER LTV 3-34100/2L-3340, dated 12 Aptil 1972

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXXIV - SCOUT S-167C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 65	LAUNCH TIME (LOCAL) 1349 PDT	LAUNCH DATE 3 October 1968	LAUNCH SITE SLC-5, VAFB, Calif.	S
PAYLOAD TYPE ESRO I	PAYLOAD WEIGHT LBS 185	MISSION TYPE 1968 84A	SCOUT MISSION TYPE NO. 50	SUCCESS RATIO* 39/42 = 0.929

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 186.885	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION, DEG 240	WIND SPEED, KNOTS 7
RELATIVE HUMIDITY, % 76	VISIBILITY, STATUTE MILES 7	TEMPERATURE, °F 64	BAROMETER, "HG 29.745

REMARKS

Countdown normal - no holds experienced and count proceeded to lift-off without incident.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-45	SPIN MOTORS (2) 0.6KS40; (2) 1.0KS75		"E" SECTION T.M. No
FIRST-STAGE MOTOR ALGOL IIB, S/N 64	SECOND-STAGE MOTOR CASTOR II, S/N 173	THIRD-STAGE MOTOR X259-B3 S/N HIB-216	FOURTH-STAGE MOTOR FW-4S S/N 2223-1

INSTRUMENTATION

Standard "D" section T/M instrumentation installed.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	812.0	835.7	+23.7	2ND STAGE 179.9	3RD STAGE 18.7
PERIGEE, N. MI.	147.3	144.8	-2.5	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	94.00	93.77	-0.23	2ND STAGE BOOST 40.2	3RD STAGE BOOST 3.8
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST 33.0	3RD STAGE COAST --
ALTITUDE, N. MI.	--	--	--		RETRO 13.1
SPIN RATE AT SEPARATION RPM	149.9	154.5	+4.6 (+3.1%)	SPIN BEARING TORQUE, IN-LBS 77	

TELEMETRY COVERAGE

VAFB (RTA) provided T/M coverage to 511 seconds with intermittent periods from 104 to 115 and 417 to 422 seconds, with loss of signal being experienced between 440 and 454 and 497 and 505 seconds; Point Mugu provided T/M coverage from 15 to 510 seconds with extended periods of intermittent data from 91 to 320 and 359 to 391 seconds.

REMARKS AND/OR ANOMALIES

1. Third-stage chamber pressure, pitch program voltage monitor, lower roll motors, large pitch motors, yaw motors, and upper roll motors measurement indication anomalies experienced approximately 10 seconds after stage ignition believed to be caused by exhaust-plume-induced ionization at the transition "D" separation plane connector and lasted for 13 seconds.
2. VAFB AN/FPS-16 provided radar coverage to 517 seconds; velocity, altitude and relative flight azimuth angle data were considered good throughout.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/8R-159 dated 4 September 1968 w/Rev. A dtd 24 Sept. 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L-4235 and -4403 dated 12 September and 27 September 1968, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/9R-7 dated 15 January 1969	TRANSMITTAL LETTER LTV Ltr. 3-34100/9L-3084 dated 27 January 1969

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE XXXV - SCOUT S-168C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 64	LAUNCH TIME (LOCAL) 1116 EDT	LAUNCH DATE 22 August 1968	LAUNCH SITE Mark II Launcher Wallops Island, Va.	S
PAYLOAD TYPE RAM C-B	PAYLOAD WEIGHT LBS 269	MISSION TYPE Re-entry	SCOUT MISSION TYPE NO 10	SUCCESS RATIO* 38/41 = 0.927

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 108.607	LAUNCH ELEVATION, DEG 90.00	WIND DIRECTION, DEG 095	WIND SPEED, KNOTS 10
RELATIVE HUMIDITY % 51	VISIBILITY, STATUTE MILES 10	TEMPERATURE, °F 84	BAROMETER, "HG 30.11

REMARKS

Countdown started at 0200 hours on 22 August; holds for guidance heaters to cycle and completion of guidance system stabilization during Task 2, for final wind aiming correction (-0.473 deg) during Task 5, for shipping in the first-stage impact area during Task 7 were called; there was also a brief hold at T - 3 minutes due to downrange support problems.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-48	SPIN MOTORS (2) 1.0KS40; (2) 1.0KS75		"E" SECTION T M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 60	SECOND-STAGE MOTOR CASTOR II, S/N 104	THIRD-STAGE MOTOR X259-B3 S/N HIB-210	FOURTH-STAGE MOTOR FW-4S S/N 2223-2

INSTRUMENTATION

Standard "D" section T/M instrumentation installed.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	--	--	--	2ND STAGE 180.8	3RD STAGE 18.9
PERIGEE, N. MI.	--	--	--	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	--	--	--	2ND STAGE BOOST 34.3	3RD STAGE BOOST 2.8
MAXIMUM VELOCITY FPS (Re-entry)	24936	24860	-76	2ND STAGE COAST 32.4	3RD STAGE COAST --
ALTITUDE, N. MI.	73.67	78.33	-4.66		RETRO 15.2
SPIN RATE AT SEPARATION RPM	188.4	180.5	-7.9 (-4.2 %)	SPIN BEARING TORQUE, IN-LBS 63.6	

TELEMETRY COVERAGE

Wallops Island provided good T/M coverage to 413 seconds except for intermittent periods between 106 and 117 seconds; Bermuda provided good T/M coverage from 121 to 421 seconds except for intermittent data subsequent to 413 seconds.

REMARKS AND/OR ANOMALIES

1. Thermal insulation added to second stage because of extended coast period.
2. Wallops Island AN/FPS-16, AN/FPQ-6 and SPANDAR radars provided coverage from 1 to 341, 1 to 420, and 126 to 391 seconds, respectively; Bermuda AN/FPS-16 and AN/FPQ-6 radars provided coverage from 260 to 415, and 252 to [illegible] seconds, respectively. Data were generally good to third-stage ignition; azimuth data was scattered during third-stage boost; velocity, azimuth and path angle were scattered during third-stage coast and during the first half of fourth-stage boost.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-32000/8R-137 dated 19 July 1968 w/Rev. A dated 16 August 1968	TRANSMITTAL LETTER LTV Ltrs. 3-32000/8L-4005 and-5006 dated 25July and 20 August 1968, respectively.
FINAL FLIGHT REPORT LTV Rpt. 3-32000/8R-194 dated 30 October 1968	TRANSMITTAL LETTER LTV Ltr. 3-32000/8L-4528 dated 31 October 1968

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE XXXVI - SCOUT S-169C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO.	LAUNCH TIME (LOCAL)	LAUNCH DATE	LAUNCH SITE	
67	1752 PST	7 November 1969	SLC-5, VAFB, Calif.	S

PAYLOAD TYPE	PAYLOAD WEIGHT LBS	MISSION TYPE	SCOUT MISSION TYPE NO	SUCCESS RATIO*
GRS-A	158	1969	52	41/44 = 0.932

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG	LAUNCH ELEVATION, DEG	WIND DIRECTION, DEG	WIND SPEED, KNOTS
197.21	90.0	170	8
RELATIVE HUMIDITY %	**VISIBILITY, STATUTE MILES**	**TEMPERATURE, °F**	**BAROMETER, "HG**
83	10	56	29.59

REMARKS

Standard "D" section T/M instrumentation installed.

CONFIGURATION

HEAT SHIELD	SPIN MOTORS	"E" SECTION T/M
34/-25, S/N A-53	(2) 1.0KS75; (2) 1.0KS40	No

FIRST-STAGE MOTOR	SECOND-STAGE MOTOR	THIRD-STAGE MOTOR	FOURTH-STAGE MOTOR
ALGOL IIB, S/N 67	CASTOR II, S/N 171	X259-B3 S/N HIB-217	FW-4S S/N 2223-5

INSTRUMENTATION

Countdown No.1 (on 6 November) scrubbed due to leaking H_2O_2 in "B" section umbilical tube and subsequent fire; no vehicle damage resulted. Countdown No. 2 (on 7 November) proceeded to lift-off.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	1744.4	1704.3	-40.1	2ND STAGE 183.1	3RD STAGE 18.5
PERIGEE, N. MI.	214.8	213.4	-1.4	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	102.67	102.96	+0.29	2ND STAGE BOOST 40.8	3RD STAGE BOOST 3.8
MAXIMUM VELOCITY FPS	--	--	--	2ND STAGE COAST 36.2	3RD STAGE COAST
ALTITUDE, N. MI.	--	--	--		RETRO 12.8
SPIN RATE AT SEPARATION RPM	178.5	179.1	+0.6 (+0.4 %)	SPIN BEARING TORQUE, IN-LBS 71.5	

TELEMETRY COVERAGE

NASA/VAFB (NMSU) station provided coverage from lift-off to 519 seconds and was primary data source for first-stage operation; Pt. Mugu station provided coverage from 16 to 517 seconds and was considered primary data source subsequent to first-stage operation; Air Force station at VAFB (TDC) provided backup support.

REMARKS AND OR ANOMALIES

1. All vehicle systems performed normally.
2. First Scout vehicle to utilize Contractor's radar data reduction routine (LS 0691) to transform data from flight test radar data magnetic tape to spherical coordinate state variables instead of extracting information from the metric data 72-hour package used on previous launches from this facility.
3. VAFB AN/FPS-16 provided radar coverage from 5 to 504 seconds and was considered best radar data for the launch; velocity, altitude and relative flight azimuth were as expected throughout flight.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-34100/9R-100 dtd 3 September 1969 w/Rev. A dtd 24 October 1969	TRANSMITTAL LETTER LTV Ltr. 3-34100/9L-3996 and 9L-4162 dated 5 September 1969 and 27 October 1969, respectively
FINAL FLIGHT REPORT LTV Rpt. 3-34100/0R-1 dated 12 January 1970	TRANSMITTAL LETTER LTV Ltr. 3-34100/0L-3083 dated 22 Jabuary 1970

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXXVII - SCOUT S-170C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 81	LAUNCH TIME (LOCAL) 2213:46.24 GMT	LAUNCH DATE 15 November 1972	LAUNCH SITE Formosa Bay, Kenya (Africa, San Marco Platform	S
PAYLOAD TYPE SAS-B	PAYLOAD WEIGHT LBS 410.13	MISSION TYPE 91A	SCOUT MISSION TYPE NO 63	SUCCESS RATIO* 55/58 = 0.948

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 87.02	LAUNCH ELEVATION, DEG 90.52	WIND DIRECTION DEG 185	WIND SPEED KNOTS 14.5
RELATIVE HUMIDITY % 80	VISIBILITY, STATUTE MILES 15.5	TEMPERATURE, °F 81	BAROMETER, "HG

REMARKS Launch conducted by Italian Centro Ricerche Aerospaziali personnel was Scout with 2nd-Algol III 1st-Stage Motor. Launched from San Marco Platform. Countdown started at 10:00 GMT and proceeded to lift-off at 22:09 GMT with no holds encountered.

CONFIGURATION

HEAT SHIELD 34/40, SN A-401	SPIN MOTORS (2) 1.0KS75 (2) 1.0KS40		"E" SECTION T M No
FIRST-STAGE MOTOR Algol III, S/N 5502-1	SECOND-STAGE MOTOR Castor IIA, S/N 195	THIRD-STAGE MOTOR ANTARES II (X259-B3) S/N HIB-304	FOURTH-STAGE MOTOR ALTAIR III, FW-4S S/N 2376-5

INSTRUMENTATION Lateral and Longitudinal vibrometers on FW-4S forward shoulder; longitudinal vibrometer on Algol III Forward Shoulder and 13 additional temperature sensors were added to Standard "E" Section T/M Measurements to study environment imposed on vehicle by ALGOL III 1st-stage motor.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	299.83	341.16	+41.33	2ND STAGE 130.1	3RD STAGE 35.4
PERIGEE, N. MI.	299.20	239.88	-59.32	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	1.8	1.9	+0.1	2ND-STAGE BOOST 57.4	3RD-STAGE BOOST 2.95
MAXIMUM VELOCITY FPS	24875.5	24846.	-29.5	2ND-STAGE COAST 26.4	3RD-STAGE COAST 1.55
ALTITUDE, N. MI.	299.75	299.72	-0.03		RETRO 12.9
SPIN RATE AT SEPARATION RPM	135.4	137.8	+2.4 (+1.8 %)	SPIN BEARING TORQUE, IN-LBS 39.8	

TELEMETRY COVERAGE

The loss of data during second and third-stage boost precluded adequate evaluation of vehicle systems. "C" section skin temperature was inoperative prior to and during flight. The special instrumentation vibrometer data was unsatisfactory due to background noise level at lift-off and loss of T/M during 2nd- and 3rd-stages.

REMARKS AND/OR ANOMALIES

1. Second Scout with ALGOL III 1st-stage motor to be launched; first with ALGOL III to be launched from San Marco platform.
2. A yaw torquing maneuver was utilized during third-stage coast to minimize orbit inclination.
3. All vehicle systms performed within specified limits during the flight.
4. A large path angle error due entirely to fourth-stage operation lowered perigee and raised apogee about 50 n. mi.
5. San Marco AN/MPS-26 radar, although exhibiting some oscillatory characteristics during 2nd- and 3rd-stage boost phases and after 440 seconds flight time, did provide satisfactory vehicle data.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN VMSC-T Rep. 3-34100/2R-46, dated 30 Aug 1972; Rev.A dtd 31 Oct 1972;Rev.B dtd 3 Nov 1972;Rev.C dtd 6 March	TRANSMITTAL LETTER VMSC-T 3-34100/2L-3903 dated 1 Sept 1972, Rev.A; VMSC-T 3-34100/2L-4145;Rev.B;VMSC-T 3-34100/2L-4176 dtd 7 Nov 1972;Rev.C;2-16000/3L-3258 dtd 2 April 1973
FINAL FLIGHT REPORT VSD 2-16000/3R-20, dated 4 May 1973	TRANSMITTAL LETTER VSD 2-56100/3AV0-99, dated 11 May 1973

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXXVIII - SCOUT S-171C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO.	LAUNCH TIME (LOCAL)	LAUNCH DATE	LAUNCH SITE
69	1606:29.184 EDT	30 September 1970	Mark II Launcher Wallops Island, Va.

PAYLOAD TYPE	PAYLOAD WEIGHT LBS	MISSION TYPE	SCOUT MISSION TYPE NO	SUCCESS RATIO*
RAMC-C	333.33	Re-entry	11	43/46 = 0.935

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG	LAUNCH ELEVATION, DEG	WIND DIRECTION, DEG	WIND SPEED, KNOTS
109.16	90.01	170	12
RELATIVE HUMIDITY, %	**VISIBILITY, STATUTE MILES**	**TEMPERATURE, °F**	**BAROMETER, "HG**
56	7	70	29.90

REMARKS

CONFIGURATION

HEAT SHIELD	SPIN MOTORS	"E" SECTION T M
34/-25 S/N A-62	(2) 1.0KS40; (2) 1.0KS75	No

FIRST-STAGE MOTOR	SECOND-STAGE MOTOR	THIRD-STAGE MOTOR	FOURTH-STAGE MOTOR
ALGOL IIB, S/N 22	CASTOR IIA, S/N 176	X259-B3 S/N HIB-221	FW-4S S/N 2223-9

INSTRUMENTATION

Standard "D" section T/M instrumentation

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	--	--	--
PERIGEE, N. MI.	--	--	--
INCLINATION, DEG	--	--	--
MAXIMUM VELOCITY FPS Re-entry	24271	24032	-239
ALTITUDE, N. MI.	74.18	76.53	+2.35
SPIN RATE AT SEPARATION RPM	177.3	179.0	+1.7 (%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE	3RD STAGE
180.00	18.9
H_2O_2 CONSUMED, LBS	
2ND-STAGE BOOST	3RD-STAGE BOOST
30.4	3.91
2ND-STAGE COAST	3RD-STAGE COAST
35.1	0.2
	RETRO
	13.4
SPIN BEARING TORQUE, IN-LBS	
62.3	

TELEMETRY COVERAGE

REMARKS AND/OR ANOMALIES

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rept. 3-34100/OR-79 dated 17 August 1970	TRANSMITTAL LETTER LTV 3-34100/OL-3885, dated 20 August 1970, Revision: LTV 3-34100/OL-3917, dated 27 August 1970
FINAL FLIGHT REPORT LTV Rept. 3-34100/OR-133 dated 30 November 1970	TRANSMITTAL LETTER LTV 3-34100/1L-3288, dated 17 March 1971 and LTV 3-34100/OL-4352, dated 4 December 1970

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XXXIX - SCOUT S-172C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 66	LAUNCH TIME (LOCAL) 1529 PDT	LAUNCH DATE 1 October 1969	LAUNCH SITE SLC-5, VAFB, Calif.	S
PAYLOAD TYPE ESRO I-B	PAYLOAD WEIGHT LBS 189	MISSION TYPE 1969	SCOUT MISSION TYPE NO 51	SUCCESS RATIO* 40/43 = 0.930

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 177.22	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION DEG 330	WIND SPEED, KNOTS 6
RELATIVE HUMIDITY % 84	VISIBILITY, STATUTE MILES 4	TEMPERATURE, °F 63	BAROMETER, "HG 29.50

REMARKS

Countdown normal; no holds were experienced and count proceeded to lift-off without incident.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A56	SPIN MOTORS (2) 1.0KS75; (2) 0.6KS40		"E" SECTION T M Yes
FIRST-STAGE MOTOR ALGOL IIB, S/N 63	SECOND-STAGE MOTOR CASTOR II, S/N 179	THIRD-STAGE MOTOR X259-B3 S/N HIB-214	FOURTH-STAGE MOTOR FW-4S S/N 2223-6

INSTRUMENTATION

Standard "D" section T/M instrumentation installed plus "E" section T/M incorporating special instrumentation for measuring ambient pressure inside the heatshield, separation sensors and an acoustic monitor.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
				2ND STAGE	3RD STAGE
APOGEE, N. MI. **	211.8	212.2	+0.4	182.2	18.5
				H_2O_2 CONSUMED, LBS	
PERIGEE, N. MI. **	170.6	164.7	-5.9	2ND STAGE BOOST	3RD STAGE BOOST
INCLINATION, DEG	86.00	85.13	-0.87	26.4	2.1
				2ND STAGE COAST	3RD STAGE COAST
MAXIMUM VELOCITY FPS	--	--	--	26.8	
					RETRO
ALTITUDE, N. MI.	--	--	--		14.7
				SPIN BEARING TORQUE, IN-LBS	
SPIN RATE AT SEPARATION RPM	148.0	150.7	+2.7 (+1.8%)	53.8	

TELEMETRY COVERAGE

NASA/VAFB (NMSU) and Pt. Mugu T/M stations provided "D" section coverage utilized for first-stage operation; Pt. Mugu was primary and NASA/VAFB (NMSU) was considered secondary coverage for second and third-stage operation. The "E" section T/M coverage was provided by Pt. Mugu and Guaymas, Mexico stations (first time for the latter) and was used to evaluate fourth-stage performance.

REMARKS AND/OR ANOMALIES

1. All vehicle systems performed within specified limits during the flight.
2. Injection altitude was 5 n. mi. low; injection velocity was 97 fps low.
3. Third-stage chamber pressure and pitch program voltage indications experienced drops at 7 seconds stage time for a period of 6 seconds.
4. Separation sensors used for first time on Scout to aid in determing fourth-stage cone center.
5. VAFB AN/FPS-16 provided very good radar coverage to 404 seconds.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV Rpt. 3-34100/9R-95 dtd 22 August 1969 w/Rev. A and B, dtd 3 September 1969 and 23 September 1969 respectively.	TRANSMITTAL LETTER LTV Ltrs. 3-34100/9L-3945, 9L-3996 and 9L-4068 dated 22 August 1969, 5 September 1969 and 25 September 1969, respectively
FINAL FLIGHT REPORT LTV Rpt. 3-34100/9R-123 dtd 3 November 1969 w/Rev. A dtd 9 January 1970.	TRANSMITTAL LETTER LTV Ltrs. 3-34100/9L-4243 and 0L-3081 dated 5 November 1969 and 22 January 1970, respectively

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

** Based on revised predicted fourth-stage motor performance.

TABLE XL - SCOUT S-173C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 72	LAUNCH TIME (LOCAL) 0732 GMT	LAUNCH DATE 24 April 1971	LAUNCH SITE Formosa Bay, Kenya, Africa, San Marco Platform	S
PAYLOAD TYPE San Marco - C	PAYLOAD WEIGHT LBS 361.44	MISSION TYPE 1971-36A	SCOUT MISSION TYPE NO. 56	SUCCESS RATIO* 46/49 = 0.939

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 84.90	LAUNCH ELEVATION, DEG 90.38	WIND DIRECTION DEG 180	WIND SPEED, KNOTS 24
RELATIVE HUMIDITY, % N/A	VISIBILITY, STATUTE MILES 12	TEMPERATURE, °F 64	BAROMETER, "HG 29.87

REMARKS

Vehicle launched from San Marco platform. Countdown started at 2025 GMT, 23 April and was essentially normal.

CONFIGURATION

HEAT SHIELD 34"-25, S/N A-54	SPIN MOTORS (2) 1.0 KS40 (2) 1.0 KS75		"E" SECTION T/M No
FIRST-STAGE MOTOR Algol IIB, S/N 74	SECOND-STAGE MOTOR Castor IIA, S/N 182	THIRD STAGE MOTOR X259-B3, Antares II S/N HIB-224	FOURTH-STAGE MOTOR FW-4S, Altair III, S/N 2223-14

INSTRUMENTATION

Standard "D" section T/M instrumentation utilized.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI. *	424.4	390.4	-34.0	2ND STAGE 187	3RD STAGE 19.5
PERIGEE, N. MI.	115.2	120.0	+ 4.8	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	2.9	3.2	+ 0.3	2ND STAGE BOOST 29	3RD STAGE BOOST 4.7
MAXIMUM VELOCITY FPS	-	-	-	2ND STAGE COAST 36.3	3RD STAGE COAST 1.3
ALTITUDE, N. MI.	-	-	-		RETRO 12.5
SPIN RATE AT SEPARATION RPM	147.2	149.2	+ 2.0 (+ 1.4 %)	SPIN BEARING TORQUE, IN-LBS 42.9	

TELEMETRY COVERAGE

Santa Rita platform provided T/M data coverage through 3rd-stage separation, except for intermittent and complete loss of signal during 2nd- & 3rd-stage burns, and for brief periods during 3rd-stage coast.

REMARKS AND/OR ANOMALIES

1. All vehicle systems performed normally. Disturbances noted on accelerometers during 3rd-stage coast, attributed to cracking of motor nozzle exit cone liner.
2. Santa Rita platform MPS-26 (C-Band) radar provided coverage from 67 to 380 seconds flight time, although data is questionable from 140 to 200 seconds because of scatter.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV RPT 3-34100/1R-17, Dated 19 March 1971	TRANSMITTAL LETTER LTV LTR 3-34100/1L-3313, Dated 24 March 1971
FINAL FLIGHT REPORT LTV RPT 3-34100/1R-73, Dated 30 Nov. 1971, W/Rev. A Dated 13 Feb. 1972	TRANSMITTAL LETTER LTV LTRS 3-34100/1L-4345 Dated 3 Dec. 1971 & 3-34100/2L-3193 Dated 24 Feb. 1972.

* VEHICLE SUCCESS RATIO [illegible] RECERTIFICATION

TABLE XLI - SCOUT S-174C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 70	LAUNCH TIME (LOCAL) 0100 EST	LAUNCH DATE 9 November 1970	LAUNCH SITE MARK II LAUNCHER, WALLOPS ISLAND, VA.	S
PAYLOAD TYPE OFO-A RMS	PAYLOAD WEIGHT LBS 338.53	MISSION TYPE 1970-94A 1970-94B	SCOUT MISSION TYPE NO 54	SUCCESS RATIO* 44/47 = 0.936

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 90.0	LAUNCH ELEVATION, DEG 90.18	WIND DIRECTION DEG 035	WIND SPEED, KNOTS 5
RELATIVE HUMIDITY, % 96	VISIBILITY, STATUTE MILES 4	TEMPERATURE, °F 54	BAROMETER,"HG 30.30

REMARKS
Countdowns No. 1 (21 Aug), No. 2 (9 Sep), No. 3 (20 Oct), No. 4 (1 Nov), and No. 5 (2 Nov) scrubbed due to spacecraft and frog problems and weather. C/D No. 6 (8 Nov) started at 1330 and was normal.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-57	SPIN MOTORS (2) 0.6 KS40 (2) 1.0 KS75		"E" SECTION T M No
FIRST-STAGE MOTOR ALGOL IIB, S/N 63	SECOND-STAGE MOTOR CASTOR IIA, S/N 175	THIRD-STAGE MOTOR X259-B3, ANTARES II S/N HIB-218	FOURTH-STAGE MOTOR FW-4S, ALTAIR III S/N 2223-3

INSTRUMENTATION
Standard "D" section T/M instrumentation utilized, with special instrumentation added for "C" section roll motor investigation.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	317.43	288.94	-28.49
PERIGEE, N. MI.	169.68	165.91	- 3.77
INCLINATION, DEG	37.686	37.424	-0.262
MAXIMUM VELOCITY FPS	-	-	-
ALTITUDE, N. MI.	-	-	-
SPIN RATE AT SEPARATION RPM	125.8	116.7	-9.1 (-7.2%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 188.5	3RD STAGE 19.1
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 25.5	3RD STAGE BOOST 3.2
2ND STAGE COAST 24.5	3RD STAGE COAST 1.2
	RETRO 13.7
SPIN BEARING TORQUE, IN-LBS 80.9	

TELEMETRY COVERAGE
Wallops Island provided good T/M coverage to 540 seconds except for periods of 2nd and 3rd-stage burns. Bermuda coverage good from 121 to 660 seconds, and USNS Range Recoverer Ship coverage good from 33 to 445 seconds.

REMARKS AND/OR ANOMALIES

1. All vehicle systems performed normally except for premature separation of spacecraft. Longitudinal accelerometer signal anomaly experienced, and 3rd stage chamber pressure indication anomaly occurred again.
2. Generally good quality radar coverage provided by W.I. An/FPS-16, AN/FPQ-6 and SPANDAR, and from Bermuda AN/FPS-16 and AN/FPQ-6 radars.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AT FLIGHT TEST PLAN LTV RPT 3-34100/OR-25, dated 17 June 1970	TRANSMITTAL LETTER LTV LTR 3-34100/OL-3677, Dated 29 June 1970
FINAL FLIGHT REPORT LTV RPT 3-34100/1R-11, Dated 2 April 1971	TRANSMITTAL LETTER LTV LTR 3-34100/1L-3359, Dated 8 April 1971

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XLII - SCOUT S-175C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 71	LAUNCH TIME (LOCAL) 1053 GMT	LAUNCH DATE 12 December 1970	LAUNCH SITE Formosa Bay, Kenya Africa, San Marco Platform	S
PAYLOAD TYPE SAS-A Explorer 42	PAYLOAD WEIGHT LBS 290.8	MISSION TYPE 1970-107A	SCOUT MISSION TYPE NO 55	SUCCESS RATIO* 45/48 = 0.938

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 84.90	LAUNCH ELEVATION, DEG 90.38	WIND DIRECTION DEG N/A	WIND SPEED, KNOTS N/A
RELATIVE HUMIDITY % N/A	VISIBILITY, STATUTE MILES N/A	TEMPERATURE, °F N/A	BAROMETER, "HG N/A

REMARKS Range Control and blockhouse located on Santa Rita platform, and vehicle launched from San Marco platform. C/D started at 2106 GMT, 11 December and was normal except during TASK 2. Launch conducted by Italian Centro Ricerche Aerospaziali personnel.

CONFIGURATION

HEAT SHIELD 34/25,S/N A-61	SPIN MOTORS (2) 1.0 KS40 (2) 1.0 KS75		"E" SECTION T M No
FIRST-STAGE MOTOR Algol IIB,S/N 66	SECOND-STAGE MOTOR Castor IIA,S/N 180	THIRD-STAGE MOTOR X259-B3 Antares II S/N HIB-226	FOURTH-STAGE MOTOR FW-4S, Altair III S/N 2223-10

INSTRUMENTATION

Standard "D" section T/M instrumentation utilized.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED	H_2O_2 ON BOARD AT LIFT OFF LBS	
APOGEE, N. MI.	301.57	308.63	+7.06	2ND STAGE 187	3RD STAGE 19.5
PERIGEE, N. MI.	289.31	287.42	-1.89	H_2O_2 CONSUMED, LBS	
INCLINATION, DEG	2.914	3.036	+0.122	2ND STAGE BOOST 35.2	3RD STAGE BOOST 3.4
MAXIMUM VELOCITY FPS	-	-	-	2ND STAGE COAST 20.8	3RD STAGE COAST 0.4
ALTITUDE, N. MI.	-	-	-		RETRO 14.7
SPIN RATE AT SEPARATION RPM	163.5	165.0	+1.5 (+0.91 %)	SPIN BEARING TORQUE, IN-LBS 57.2	

TELEMETRY COVERAGE Santa Rita platform provided T/M data through 3rd-stage separation, except for loss of signal during 2nd- & 3rd-stage burns and for brief periods during 3rd-stage coast.

REMARKS AND/OR ANOMALIES

1. All vehicle systems performed normally. Third-stage chamber pressure indication anomaly experienced at 13.26 seconds after 3rd-stage ignition.
2. Santa Rita platform MPS-26 (C-Band) radar provided coverage from 66 to 669 seconds flight time, although data is questionable after 3rd-stage separation.

DOCUMENTATION

☒ NASA PREFLIGHT PLANNING REPORT ☐ AF FLIGHT TEST PLAN LTV RPT 3-34100/OR-116, Dated 7 October 1970	TRANSMITTAL LETTER LTV LTR 3-34100/OL-4157 & -4255, Dated 14 Oct 1970 & 10 Nov. 1970, respectively
FINAL FLIGHT REPORT LTV RPT 3-34100/1R-35, Dated 4 June 1971	TRANSMITTAL LETTER LTV LTR 3-34100/1L-3609 Dated 15 June 1971

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XLIII - SCOUT S-176C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 68	LAUNCH TIME (LOCAL) 0623 PDT	LAUNCH DATE 27 Aug 1970	LAUNCH SITE SLC-5, SVAFB, CALIF	S
PAYLOAD TYPE N-14	PAYLOAD WEIGHT LBS 128.22	MISSION TYPE 1970-67A	SCOUT MISSION TYPE NO 53	SUCCESS RATIO* 42/45=0.933

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 181.95	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION DEG 330	WIND SPEED, KNOTS 4
RELATIVE HUMIDITY, % 92	VISIBILITY, STATUTE MILES 7	TEMPERATURE, °F 54	BAROMETER, "HG 29.69

REMARKS

Countdown was begun at 0010 hours on 27 August and was normal. No wind aiming correction required since Roll-Yaw Compensation Unit was utilized.

CONFIGURATION

HEAT SHIELD 34/-25,S/N A-55	SPIN MOTORS (2) 0.6 KS 40 (2) 1.0 KS40		"E" SECTION T.M No
FIRST-STAGE MOTOR Algol IIB, S/N 75	SECOND-STAGE MOTOR Castor IIA,S/N184	THIRD-STAGE MOTOR X259-B3,Antares II S/N HIB-219	FOURTH-STAGE MOTOR X258-E5, Altair II S/N ABL-149

INSTRUMENTATION

Standard "D" section T/M instrumentation utilized.
Improved "D" section incorporated.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	627.13	664.60	+37.47
PERIGEE, N. MI.	586.02	519.85	-66.17
INCLINATION, DEG	90.0	90.02	+ 0.02
MAXIMUM VELOCITY FPS	-	-	-
ALTITUDE, N. MI.	-	-	-
SPIN RATE AT SEPARATION RPM	166.9	165.0	-1.9 (-1.1%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 157	3RD STAGE 19
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 44.6	3RD STAGE BOOST 5.3
2ND STAGE COAST 11.4	3RD STAGE COAST 1.3
	RETRO 11.5
SPIN BEARING TORQUE, IN-LBS 70.4	

TELEMETRY COVERAGE

SAMTEC/VAFB (RTA) station provided coverage from lift-off to 760.56 seconds flight time and was primary data source for first-stage operation. NASA/VAFB (MMSU) and SNI (PMR) stations also provided coverage through 760.50 seconds. SNI was primary data source for 2nd- & 3rd-stage performance evaluation.

REMARKS AND/OR ANOMALIES

1. All vehicle system performed normally except for 2nd-stage yaw left reaction control motor pressure switch experiencing a temporary malfunction by registering a pressurized condition after 2nd-stage ignition.
2. 3rd-stage chamber pressure indication anomaly occurred 2.75 seconds after 3rd-stage ignition.
3. VAFB and SNI AN/FPS-16's provided radar coverage to 921.97 seconds.

DOCUMENTATION

☐ NASA PREFLIGHT PLANNING REPORT ☒ AF FLIGHT TEST PLAN LTV RPT. 3-34100/OR-85, DTD 24 July 1970	TRANSMITTAL LETTER LTV LTR 3-34100/OL-3797, Dated 27 July 1970
FINAL FLIGHT REPORT LTV RPT 3-34100/OR-126, Dated 30 October 1970	TRANSMITTAL LETTER LTV LTR 3-34100/OL-4270, Dated 10 November 1970

* VEHICLE SUCCESS RATIO SINCE RECERTIFICATION

TABLE XLIV - SCOUT S-177C POSTFLIGHT SUMMARY.

LAUNCH DATA

SCOUT LAUNCH NO. 74	LAUNCH TIME (LOCAL) 1858 EDT	LAUNCH DATE 8 July 1971	LAUNCH SITE MARK II LAUNCHER WALLOPS ISLAND, VA.	S
PAYLOAD SOLRAD-10(C) EXPLORER 44	PAYLOAD WEIGHT LBS 263.0	MISSION TYPE 1971-58A	SCOUT MISSION TYPE NO. 57	SUCCESS RATIO* 48/51=0.941

COUNTDOWN

LAUNCH AZIMUTH (TRUE), DEG 128.98	LAUNCH ELEVATION, DEG 90.0	WIND DIRECTION DEG 033	WIND SPEED, KNOTS 10
RELATIVE HUMIDITY, % 74	VISIBILITY, STATUTE MILES 6	TEMPERATURE, °F 82	BAROMETER, "HG 30.15

REMARKS

Countdown was started at 1248 EDT, 8 July, and was normal.

CONFIGURATION

HEAT SHIELD 34/-25, S/N A-59	SPIN MOTORS (2) 1.0 KS40 (2) 1.0 KS75		"E" SECTION T M Yes
FIRST-STAGE MOTOR Algol IIB, S/N 76	SECOND-STAGE MOTOR Castor IIA S/N 181	THIRD-STAGE MOTOR X259-B3, Antares II S/N HIB-223	FOURTH-STAGE MOTOR FW-4S, Altair III S/N 2223-7

INSTRUMENTATION Standard "D" section and "E" section T/M instrumentation utilized. Special instrumentation added for battery and separation clamp release and spring actuation information.

PERFORMANCE

PARAMETER	PREDICTED	ACTUAL	DEVIATION FROM PREDICTED
APOGEE, N. MI.	323.44	345.28	+21.84
PERIGEE, N. MI.	304.80	238.94	-65.86
INCLINATION, DEG	51.43	51.05	- 0.38
MAXIMUM VELOCITY FPS	-	-	-
ALTITUDE, N. MI.	-	-	-
SPIN RATE AT SEPARATION RPM	139.2	144.2	+5.0 (+3.6%)

H_2O_2 ON BOARD AT LIFT OFF LBS	
2ND STAGE 181.5	3RD STAGE 18.9
H_2O_2 CONSUMED, LBS	
2ND STAGE BOOST 33.5	3RD STAGE BOOST 2.4
2ND STAGE COAST 6.2	3RD STAGE COAST 1.8
	RETRO 13.7
SPIN BEARING TORQUE, IN-LBS 41.8	

TELEMETRY COVERAGE Wallops Island and Bermuda stations provided combined "D" and "E" sections T/M coverage from launch to 850 seconds flight time. Antigua provided "E" section T/M coverage from 250 to 1050 seconds flight time.

REMARKS AND/OR ANOMALIES

1. All vehicle systems performed normally. 3rd-stage chamber pressure anomalies experienced at 6.24 seconds after 3rd-stage ignition. Disturbances noted on accelerometers at three different times during 4th-stage coast
2. W.I. An/FPS-16, AN/FPQ-6 and SPANDAR radars provided combined tracking coverage from 7 to 672 seconds. Bermuda AN/FPQ-6 provided coverage from 183 to 564 seconds.

DOCUMENTATION

NASA PREFLIGHT PLANNING REPORT LTV RPT 3-34100/OR-130, Dated 15 Nov 70 W/Rev A DTD 22 Apr 71&Rev B DTD 30 Jun 1971	TRANSMITTAL LETTER LTV LTRS 3-34100/OL-4302 & 3-34100/1L-3442 & -3032, DTD Dated 13 Feb 1971, 5 May 1971 & 2 July 1971, Respectively.
FINAL FLIGHT REPORT LTV RPT 3-34100/2R-5, Datd 23 Feb 1972 W/Rev A dated [illegible] August 1972	TRANSMITTAL LETTER LTV LTRS 3-34100/2L-32[illegible] & -3[illegible], Dated 2 Mar 1972 & 22 Aug 1972, Respectively

* VEHICLE SUCCESS RATIO SINCE FLIGHT [illegible]

TABLE XLV - SUMMARY OF ALL SCOUT MISSIONS IN PHASES IV AND V.

ORDER OF FIRING	VEHICLE NO. TYPE MISSION	CONFIGURATIONS			FLIGHT SYNOPSIS	REFERENCE CONTRACT NO.	SPIN RATE rpm	
		MOTORS	VEHICLE	HEATSHIELD			PREDICTED	ACTUAL
38	S-138 Orbital	1st Stage ALGOL IIB S/N 35 2nd Stage CASTOR I (XM33-E5) S/N 178 3rd Stage ANTARES II (X259-A3) S/N HPC-154 4th Stage ALTAIR II (X258-E6) S/N RH-125	Guidance system provided yaw torquing maneuver during third-stage coasting to achieve specific orbital inclination. "E" section including a T/M system and a velocity meter replaced the standard payload adaptor. Spin bearing modified by installing oversize balls in effort to increase stiffness.	34.0/-25.0 S/N A-26	Yaw torquing maneuver successful. E section performed properly. Velocity Meter performed as desired. Calculated spin bearing joint stiffness approximately same as on previous Scout vehicles. Flight records indicated mass unbalance of 0.1795 slug-ft^2 at fourth-stage burnout. Flight data indicated 4th-stage coning increased to approximately 16-deg half-cone angle 500 sec after fourth-stage burnout. Satisfactory.	3-30000/6R-4 "Scout S-138 Final Flight Report," dated 23 February 1966. Contract NAS1-4664	177.2 at ignition; 181.2 at burnout	179.5 at ignition; 185.0 at burnout
39	S-139 Orbital	1st Stage ALGOL IIB S/N 37 2nd Stage CASTOR I (XM33-E5) S/N 189 3rd Stage ANTARES II (X259-A3) S/N HPC-165 4th Stage ALTAIR II (X258-E6) S/N RH-126	Four 1.0KS40 spin motors installed. No. 1 fin tip modified to permit vehicle air transport. Special instrumentation to measure vibration in H_2O_2 tanks in transition "C" section.	34.0/-25.0 S/N A-28	All systems functioned normally. Payload placed in desired orbit. Satisfactory.	3-30000/6R-6 "Scout S-139 Final Flight Report," dated 18 March 1966. Contract NAS1-4664	169.7 at ignition; 179.5 at burnout	N/A
40	S-140C Orbital	1st Stage ALGOL IIB S/N 38 2nd Stage CASTOR II S/N 24 3rd Stage ANTARES II (X259-A3) S/N HPC-173 4th Stage ALTAIR II (X258-E6) S/N RH-129	Spin motion monitor installed. First Scout launched from SVAFB to incorporate CASTOR II 2nd-stage motor.	34.0/-25.0 S/N A-14	Payload placed in specified orbit. A 60-second interruption of the command-destruct function at T + 136 seconds attributed to inadvertent transfer to Point Pillar rather than San Nicholas Island. Deviation from predicted inclination angle attributed to adverse build-up of incremental error sources. Satisfactory.	3-30000/6R-7 "Scout S-140 Final Flight Report, dated 17 March 1966. Contract NAS1-4664	151.2 at ignition; 160.0 at burnout	156.07 at 3rd-stage separation
41	S-142C Orbital	1st Stage ALGOL IIB S/N 44 2nd Stage CASTOR II S/N 17 3rd Stage ANTARES II (X259-A3) S/N HPC-169 4th Stage ALTAIR II (X258-E6) S/N RH-116	Vehicle did not incorporate any design improvements, special instrumentation or configuration changes not previously used on Scout vehicles.	34.0/-25.0 S/N A-22	Primary objective to provide boost and trajectory for specified orbit of payload accomplished. The 40KHz subcarrier oscillator failed from T - 132 seconds to T + 669 seconds. During 4th-stage spin-up, the two spin disconnectors between 3rd & 4th stage interfered with wire bundle clamp; not detrimental to the flight. First Scout launch on which the wind aiming procedure was available. Satisfactory	3-30000/6R-10 "Scout Final Flight Report, dated 3 May 1966. Contract NAS1-4664	153.3 at ignition; 167.5 at burnout	147.9 at 3rd stage separation
42	S-141C Re-entry	1st Stage ALGOL IIB S/N 40 2nd Stage CASTOR I (XM33-E5) S/N 190 3rd Stage ANTARES II (X259-A3) S/N HPC-172 4th Stage ALTAIR II (X258-E6) S/N RH-117 5th Stage NOTS 100B S/N 63	Protective cork added to heatshield and lower "D" section to insulate against heat created due to skin friction during low level flight operations. Spin Bearing Support Temperature monitored to determine heat rise affects of new stiffer spin bearing (first used on S-136).	34.0/-25.0 S/N A-24	Over-all mission objective successfully completed. Payload delay T/M transmitter failed at fifth-stage ignition; data during black-out period of flight not obtained. Satisfactory.	3-30000/6R-13 "Scout Final Flight Report," dated 16 May 1966. Contract NAS1-4664	169.2 at ignition; 179.0 at burnout	174.2 at ignition; 182.2 at burnout

TABLE XLV Continued - SUMMARY OF ALL SCOUT MISSIONS IN PHASES IV AND V.

ORDER OF FIRING	VEHICLE NO. TYPE MISSION	CONFIGURATIONS			FLIGHT SYNOPSIS	REFERENCE CONTRACT NO.	SPIN RATE rpm	
		MOTORS	VEHICLE	HEATSHIELD			PREDICTED	ACTUAL
43	S-143C Orbital	1st Stage ALGOL IIB S/N 41 2nd Stage CASTOR II S/N 16 3rd Stage ANTARES II (X259-A3) S/N HPC-170 4th Stage ALTAIR II (X258-E6) S/N RH-118	Vehicle did not incorporate any design improvements, special instrumentation or configuration changes not previously used on Scout vehicles.	34.0/-25.0 S/N A-31	All systems functioned normally. Payload placed in desired orbit. Satisfactory	3-30000/6R-22 "Scout Final Flight Report," dated 17 June 1966. Contract NAS1-4664	151.4 at ignition; 160.1 at burnout	155.1 at ignition
44	S-145C Orbital	1st Stage ALGOL IIB S/N 43 2nd Stage CASTOR II S/N 20 3rd Stage ANTARES II (X259-A3) S/N HPC-174 4th Stage ALTAIR III (FW-4S) S/N 20031A	Spin bearing temperature monitor installed. Vibrometers installed on 500-pound pitch motor valve and aft shoulder of the CASTOR II motor. "E" section PC-24 separation bolts replaced with PC-33 bolts (Payload agency request).	34.0/-25.0 S/N A-29	All systems functioned normally. Payload placed in desired orbit. Post-launch film revealed small object may have fallen off vehicle at approximately T + 8 seconds; may have been guidance tunnel cover from lower "B" or "C" section; no discrepancies noted in the vehicle performance. Satisfactory.	3-30000/6R-20 Scout Final Flight Report, dated 15 July 1966. Contract NAS1-4664	138.5 at ignition; 138.6 at burnout	140.7 at ignition
45	S-146C Orbital	1st Stage ALGOL IIB S/N 45 2nd Stage CASTOR II S/N 18 3rd Stage ANTARES II (X259-A3) S/N HPC-164 4th Stage ALTAIR II (X258-E6) S/N RH-110	Vehicle did not incorporate any design changes, improvements, or configuration changes. Two instrumentation measurements incorporated for first time: (a) Base "A" Servo Amplifier Vibrometer (transverse axis); (b) ALGOL aft shoulder vibrometer (long. axis).	34.0/-25.0 S/N A-32	All systems functioned normally. Payload placed in desired orbit. Satisfactory	3-30000/6R-35 Scout Final Flight Report, dated 12 August 1966. Contract NAS1-4664	153.3 at ignition; 162.1 at burnout	154.3 at ignition
46	S-147C Orbital	1st Stage ALGOL IIB S/N 50 2nd Stage CASTOR II S/N 19 3rd Stage ANTARES II (X259-A3) S/N HPC-161A 4th Stage ALTAIR III (FW-4S) S/N 20039	Four additional "B" section temperature sensors installed to measure component temperatures not previously measured with the CASTOR II motor configuration. Vibrometers installed on the PCR box in lower "D" section and third-stage motor forward shoulder.	34.0/-25.0 S/N A-30	All systems functioned normally with exception of first-stage T/M chamber pressure anomaly which did not affect vehicle performance. Payload successfully placed in orbit. Satisfactory.	3-30000/6R-24 "Scout Final Flight Report," dated 16 September 1966. Contract NAS1-4664	130.4 at ignition; 130.4 at burnout	134.7 at ignition
47	S-148C Orbital	1st Stage ALGOL IIB S/N 39 2nd Stage CASTOR II S/N 21 3rd Stage ANTARES II (X259-A3) S/N HPC-163 4th Stage ALTAIR III (FW-4S) S/N 20105	"C" section H_2O_2 tank temperature measurements on X-259 nozzle and skin sides of tank were installed to provide data to better evaluate the H_2O_2 consumption and pressure.	34.0/-25.0 S/N A-33	Primary objective to provide boost and trajectory for specified orbit of the payload accomplished. Telemetry pitch displacement channel inoperative prior to and during entire flight. Satisfactory	3-30000/6R-30 Scout Final Flight Report, dated 4 November 1966. Contract NAS1-4664	129.1 at 3rd-stage separation	134.7 at 3rd-stage separation

TABLE XLV Continued - SUMMARY OF ALL SCOUT MISSIONS IN PHASES IV AND V.

ORDER OF FIRING	VEHICLE NO. TYPE MISSION	CONFIGURATIONS			FLIGHT SYNOPSIS	REFERENCE CONTRACT NO.	SPIN RATE rpm	
		MOTORS	VEHICLE	HEATSHIELD			PREDICTED	ACTUAL
48	S-149C Orbital	1st Stage ALGOL IIB S/N 48 2nd Stage CASTOR II S/N 25 3rd Stage ANTARES II (X259-A3) S/N HPC-177A 4th Stage ALTAIR II (X258-E6) S/N RH-136	Payload-furnished adapter installed in place of transition "E" section. Additional thermistor installed in Base "A" section to measure ambient temperature.	34.0/-25.0 S/N A-34	Primary objective to provide boost and trajectory for specified orbit accomplished. Post-flight investigation initiated to determine means of reducing first-stage thermal induced roll (temperature affects on fins). Post-flight investigation of suspected leak in 2-lb lower small pitch motor (third-stage). Satisfactory	3-30000/6R-38 "Scout Final Flight Report, dated 31 October 1966. Contract NAS1-4664	157.9 at 3rd-stage separation	159.3 at 3rd-stage separation
49	S-150C Orbital	1st Stage ALGOL IIB S/N 47 2nd Stage CASTOR II S/N 27 3rd Stage ANTARES II (X259-A3) S/N HPC-181 4th Stage ALTAIR III (FW-4S) S/N 30201	Standard "E" section payload adapter replaced with instrumented "E" section. External surfaces of the Base "A" fins covered with 0.10-inch thick Armstrong #2755 cork. Servo amplifier temperature sensor installed. Spin bearing inner race temperature sensor installed.	34.0/-25.0 S/N A-35	Primary objective to provide boost and trajectory for specified orbit of payload accomplished. Third-stage small pitch motor apparently began to leak during third-stage coast. Airplane telemetry coverage of this flight contributed no additional information to that obtained from South Vandenberg and/or Pt. Mugu receiving stations. Third-stage roll anomaly during spin-up not detrimental to flight objective. Satisfactory.	3-30000/7R-3 "Scout Final Flight Report," dated 23 January 1967. Contract NAS1-6020	156.1 at 3rd-stage separation	166.0 at 3rd-stage separation
50	S-151C Orbital	1st Stage ALGOL IIB S/N 42 2nd Stage CASTOR II S/N 29 3rd Stage ANTARES II (X259-A3) S/N HPC-184 4th Stage ALTAIR III (FW-4S) S/N 30204	Instrumented "E" section replaced standard "E" section adapter. Second Scout to incorporate 0.10-inch thick covering of Armstrong #2755 on the Base "A" fins to provide thermal protection to fin tip control actuators. Thermal sensor installed to measure Base "A" ambient temperature for possibility of exhaust gases flowing into Base "A" section.	34.0/-25.0 S/N A-36	All systems functioned satisfactorily until 420.431 seconds flight time at which time failure of the fourth-stage motor graphite nozzle insert resulted in rupture of the motor case. Spacecraft was not injected into Earth orbit. Unsatisfactory.	3-30000/7R-7 "Scout S-151C Final Flight," dated 17 March 1967. Contract NAS1-6020	153.8 at 3rd-stage separation	168 at 3rd-stage separation
51	S-154C Orbital	1st Stage ALGOL IIB S/N 51 2nd Stage CASTOR II S/N 98 3rd Stage ANTARES II (X259-A3) S/N HPC-163A 4th Stage ALTAIR II (X258-E6) S/N ABL-134	Vehicle did not incorporate any design changes, improvements or configuration changes not previously used on Scout vehicles.	34.0/-25.0 S/N A-37	All systems functioned satisfactorily. Spacecraft placed in desired Earth orbit. Satisfactory.	3-32000/7R-155 "Scout S-154C Final Flight Report," dated 5 September 1967 Contract NAS1-6020	159.9 at 3rd-stage separation	166.7 at 3rd-stage separation
	S-153C [illegible]	1st Stage ALGOL IIB S/N 46 2nd Stage CASTOR II [illegible] 3rd [illegible] (X259-A3) S/N HPC-182 4th Stage ALTAIR III (FW-4S) S/N 30202	"C" band radar beacon removed and replaced with Whittaker roll-stabilized free gyro for Range Safety purposes.	34.0/-25.0 S/N A-43	First Scout launch from mobile platform and first direct equatorial launch. Spacecraft placed in satisfactory Earth orbit. Satisfactory.	3-32000/8R-143, "Scout S-153C Final Flight Report," dated 15 August 1968. Contract NAS1-6020	162.7 at 3rd-stage separation	170.8 at 3rd-stage separation
53	S-155C Orbital	1st Stage ALGOL IIB S/N 52 2nd Stage CASTOR II S/N 100 3rd Stage ANTARES II (X259-A3) S/N HIB-202 4th Stage ALTAIR II (X258-E6) S/N ABL-143	Special thermistor added to measure temperature of the support near the tracking beacon and the support near the telemetry transmitter.	34.0/-25.0 S/N A-41	All systems functioned satisfactorily except for instrumentation. Spacecraft placed in desired Earth orbit. Satisfactory	3-32000/7R-148, "Scout S-155C Final Flight Report," dated 21 August 1967. Contract NAS1-6020	146.2 at 3rd-stage separation	154.4 at 3rd-stage separation
54	S-156C Orbital	1st Stage ALGOL IIB S/N 56 2nd Stage CASTOR II S/N [illegible] 3rd Stage ANTARES II (X259-A3) S/N HIB-201 4th Stage ALTAIR II (X258-E6) S/N ABL-139	Vehicle did not incorporate any design changes, improvements, or configuration changes not previously used on Scout vehicles.	34.0/-25.0 S/N A-39	All systems functioned satisfactorily. Spacecraft placed in desired Earth orbit. Satisfactory.	3-32000/7R-182, "Scout S-156C Final Flight Report," dated 23 October 1967. Contract NAS1-6020	159.5 at 3rd-stage separation	162.8 at 3rd-stage separation
55	S-152C Orbital	1st Stage ALGOL IIB S/N 49 2nd Stage CASTOR II S/N 26 3rd Stage ANTARES II (X259-A3) S/N HPC-151A 4th Stage ALTAIR III (FW-4S) S/N 30206	Instrumented "E" section replaced standard "E" section adapter. A thermistor was relocated to measure "E" section telemetry transmitter temperature; two resistance probes were added to "E" section instrumentation to measure temperature of the FW-4S motor attachment flange and the motor case.	34.0/-25.0 S/N A-40	All systems functioned normally to third-stage ignition at 176.280 seconds; at 186 seconds, third-stage chamber pressure became higher than normal and began to drop rapidly at 195 seconds with catastrophic failure of the motor occurring at 201.540 seconds (25.260 seconds stage time), accompanied by severe shock impulse and total loss of "C" section telemetry instrumentation. It is believed that motor case burnthrough, most probably precipitated by cracking of the Epirez/Epicure resin embedment bond, activated vehicle "destruct charges". Spacecraft was not injected into Earth orbit. Unsatisfactory.	3-32000/7R-144, "Scout S-152C Final Flight Report," dated 4 August 1967. Contract NAS1-6020	170.9 at 3rd-stage separation	N/A

TABLE XLV Continued - SUMMARY OF ALL SCOUT MISSIONS IN PHASES IV AND V.

ORDER OF FIRING	VEHICLE NO. TYPE MISSION	CONFIGURATIONS			FLIGHT SYNOPSIS	REFERENCES CONTRACT NO.	SPIN RATE rpm	
		MOTORS	VEHICLE	HEATSHIELD			PREDICTED	ACTUAL
56	S-157C Orbital	1st Stage ALGOL IIB S/N 53 2nd Stage CASTOR II S/N 96 3rd Stage ANTARES II (X259-B3) S/N HIB-220 4th Stage ALTAIR II (X258-B6) S/N ABL-135	Vehicle did not incorporate any design changes improvements, or configuration changes not previously used on Scout vehicles.	34.0/-25.0 S/N A-42R	All vehicle systems performed within specified limits with the exception of the roll-rate gyro, which indicated a partial malfunction during the latter portion of 2nd and 3rd-stage boost, characterized by a reduced amplitude output with a time lag of 0.1 second when longitudinal acceleration was in excess of 6 "g"; considered a random, isolated occurrence and not due to a design deficiency. First time experienced on Scout and did not compromise the mission. Satisfactory.	3-32000/3R-13, "Scout S-157C Final Flight Report," dated 15 January 1968. Contract NAS1-6020	159.5 at 3rd-stage separation	163.1 at 3rd-stage separation
57	S-159C Re-entry	1st Stage ALGOL IIB S/N 54 2nd Stage CASTOR II S/N 101 3rd Stage ANTARES II (X259-A3) S/N HIB-205 4th Stage ALTAIR III (FW-4S) S/N 30207	First Scout vehicle to use modified second and third-stage body bending filter in the control system to prevent opposite pitch and yaw control motors from firing at the bending frequencies as a result of control system structural coupling. Thermal insulation (aluminum reflective tape) added to the CASTOR II motor nozzle cone, and to the H_2O_2 lines and quarter-inch N_2 pilot lines in the vicinity of the 500-lb reaction control motors.	34.0/-25.0 S/N A-25	All vehicle systems performed within specified limits; planned payload re-entry environment was achieved. Satisfactory.	3-32000/8R-46, "Scout S-159C Final Flight Report," dated 29 February 1968. Contract NAS1-6020	177.1 at 3rd-stage separation	173.5 at 3rd-stage separation
58	S-158C Orbital	1st Stage ALGOL IIB S/N 57 2nd Stage CASTOR II S/N 105 3rd Stage ANTARES II (X259-B3) S/N HIB-212 4th Stage ALTAIR III (FW-4S) S/N 30210	Vehicle did not incorporate any design improvements, special instrumentation or configuration changes not previously used on Scout vehicles. Instrumented "E" section replaced standard "E" section adapter.	34.0/-25.0 S/N A-38	All vehicle systems performed within specified limits. Disturbances were noted on the longitudinal, normal and transverse accelerometers during the third and fourth-stage coast periods, probably resulting from cracking of the nozzle exit cone liner on the third and fourth-stage motors; not detrimental to Scout performance and does not compromise structural integrity of the vehicle. Spacecraft placed in desired Earth orbit. Satisfactory	3-32000/8R-83, "Scout S-158C Final Flight Report," dated 6 May 1968 with Revision A dated 6 August 1968. Contract NAS1-6020	167.5 at 3rd-stage separation	168.2 at 3rd-stage separation
59	S-162C Orbital	1st Stage ALGOL IIB S/N 58 2nd Stage CASTOR II S/N 170 3rd Stage ANTARES II (X259-B3) S/N HIB-213 4th Stage ALTAIR II (X258-E5) S/N ABL-145	Standard Scout launch vehicle except for incorporation of a pair of dummy launch fitting fairings bonded to Base "A" in a mirror image position with respect to the standard fittings.	34.0/-25.0 S/N A-44	All vehicle systems performed within specified limits. Spacecraft placed in desired Earth orbit.	3-32000/8R-132, "Scout S-162C Final Flight Report," dated 12 July 1968 with revision pages dated 9 August 1968. Contract NAS1-6020	171.1 at 3rd-stage separation	169.2 at 3rd-stage separation
60	S-160C Orbital	1st Stage ALGOL IIB S/N 62 2nd Stage CASTOR II S/N 97 3rd Stage ANTARES II (X259-B3) S/N HIB-206 4th Stage ALTAIR III (FW-4S) S/N 2218-8	Dummy launch fitting fairings bonded to Base "A" in a mirror image position with respect to the standard fittings. Guidance system provided yaw torquing maneuver during third-stage coasting to achieve desired orbital inclination.	34.0/-25.0 S/N A-46	All vehicle systems performed within specified limits except for several disturbances during first-stage boost associated with progressive failure of the ALGOL IIB nozzle RVA graphite insert; abrupt 28% reduction in thrust experienced at 32.8 seconds flight time. Spacecraft placed in acceptable Earth orbit. Satisfactory.	3-32000/8R-100, "Scout S-160C Final Flight Report," dated 24 May 1968 3-32000/8R-60, "Scout S-160 First-Stage Anomaly Investigation - Final Report," dated 28 October 1968. Contract N[illegible]20	162.5 at 3rd-stage separation	166.9 at 3rd-stage separation

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE XLV Continued - SUMMARY OF ALL SCOUT MISSIONS IN PHASES IV AND V.

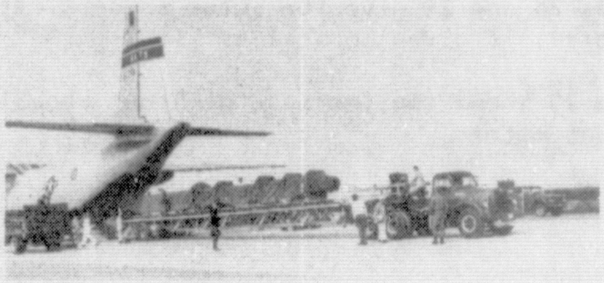
ORDER OF FIRING	VEHICLE NO / TYPE MISSION	CONFIGURATIONS			FLIGHT SYNOPSIS	REFERENCES / CONTRACT NO.	SPIN RATE rpm	
		MOTORS	VEHICLE	HEATSHIELD			PREDICTED	ACTUAL
61	S-164C Re-entry	1st Stage ALGOL IIB S/N 65 2nd Stage CASTOR II S/N 174 3rd Stage ANTARES II (X259-B3) S/N HIB-209	Two 0.6KS40 spin motors only installed, first Scout with this spin motor configuration. Uppermost transition section was standard Scout lower "D" section on this vehicle, modified to incorporate phenolic-glass laminate heatshield for aerodynamic smoothness and thermal protection for "D" section pyrotechnics and structure up to the time of payload spin-up; middle "D" and upper "D" sections were special for this mission. Payload mounted on special "D" section which included Marman clamp and special fairing across spin bearing joint until the spin-up event, separation of the Marman clamp also provided for ejection of the heatshield. Thermal insulation (aluminum reflective tape) added to CASTOR II motor nozzle cone, and to the hydrogen peroxide lines and the nitrogen quarter-inch pilot lines in the vicinity of the 500-pound reaction control motors.	Non-standard	All vehicle systems performed within specified limits. Payload subjected to acceptable re-entry conditions. Satisfactory	3-32000/SR-161, "Scout S-164C Final Flight Report," dated 30 July 1966, as revised 15 August 1966. Contract NAS1-6020	52.2	60.7 at third-stage separation
62	S-161C Orbital	1st Stage ALGOL IIB S/N 59 2nd Stage CASTOR II S/N 103 3rd Stage ANTARES II (X259-B3) S/N HIB-207 4th Stage ALTAIR III (FW-4S) S/N 2218-10	Dummy launch fitting fairings bonded to Base "A" in a mirror image position with respect to the standard fittings. Instrumented "E" section replaced standard "E" section adapter and included a high frequency response accelerometer, vibrometer installed on the aft flange of the third-stage motor and high frequency response accelerometer added to "D" section telemetry to aid in locating source of third-stage coast disturbance. Lower "D" section structure temperature measured in place of ambient temperature on this vehicle only.	34.0/-25.0 S/N A-4[illegible]	All vehicle systems performed within specified limits. Disturbances were noted on the longitudinal, normal and transverse accelerometers during fourth-stage coast. Experienced third-stage roll motion anomaly at fourth-stage spin-up; roll rate increased to 6.9 deg/sec at separation, did not compromise mission success. Spacecraft placed in desired Earth orbit. Satisfactory	3-32000/SR-156, "Scout S-161C Final Flight Report," dated 30 August 1965 Contract NAS1-6020	170.0 at fourth-stage ignition	171.[illegible] at fourth-stage ignition
63	S-165C Orbital	1st Stage ALGOL IIB S/N 73 2nd Stage CASTOR II S/N 172 3rd Stage ANTARES II (X259-B3) S/N HIB-215 4th Stage ALTAIR III (FW-4S) S/N 2223-4	First Scout vehicle to incorporate reworked nozzle and insulated igniter on first-stage ALGOL IIB motor as a result of vehicle S-162. Guidance system provided yaw torquing maneuver during third-stage coast to align vehicle and velocity vectors for maximum performance.	34.0/-25.0 S/N A-47	All vehicle systems performed within specified limits. Spacecraft placed in desired Earth orbit. Satisfactory	3-32000/SR-190, "Scout S-165C Final Flight Report," dated 15 October 1965 Contract NAS1-6020	175.[illegible] at third-stage separation	[illegible] at third-stage separation
64	S-168C Re-entry	1st Stage ALGOL IIB S/N 60 2nd Stage CASTOR II S/N 104 3rd Stage ANTARES II (X259-B3) S/N HIB-210 4th Stage ALTAIR III (FW-4S) S/N 2223-2	Thermal insulation (aluminum reflective tape) added to CASTOR II motor nozzle cone, and to the hydrogen peroxide lines and the nitrogen quarter-inch pilot lines in the vicinity of the 500-pound reaction control motors.	34.0/-25.0 S/N A-4[illegible]	All vehicle systems performed within specified limits. Payload subjected to satisfactory re-entry environment. Satisfactory	3-32000/SR-194, "Scout S-168C Final Flight Report," dated 30 October 1965 Contract NAS1-6020	[illegible] at third-stage separation	[illegible] at third-stage separation
65	S-167C Orbital	1st Stage ALGOL IIB S/N 64 2nd Stage CASTOR II S/N 173 3rd Stage ANTARES II (X259-B3) S/N HIB-216 4th Stage ALTAIR III (FW-4S) S/N 2223-1	Standard Scout launch vehicle.	34.0/-25.0 S/N A-45	All vehicle systems performed within specified limits except for six parameter measurements in the telemetry system during third-stage boost. Spacecraft placed in desired near-polar elliptical Earth orbit. Satisfactory	3-34100/SR-7, "Scout S-167C Final Flight Report," dated 15 January 1969 Contract NAS1-7256 (Vehicle launched under Contract NAS1-6020)	149.9 at third-stage separation	154.5 at third-stage separation
66	S-172C Orbital	1st Stage ALGOL IIB S/N 63 2nd Stage CASTOR II S/N 179 3rd Stage ANTARES II (X259-B3) S/N HIB-214 4th Stage ALTAIR III (FW-4S) S/N 2223-6	Standard Scout B launch vehicle. Incorporated instrumented "E" section with special electrical sensors (4 at 90°) and used for first time on Scout to aid in determining fourth-stage tip-off; also, measured ambient pressure within the heatshield.	34.0/-25.0 S/N A-50	All vehicle systems performed within specified limits. Payload placed in acceptable Earth orbit. Satisfactory	3-34100/SR-123, "Scout S-172C Final Flight Report," dated 3 November 1969 with Revision A pages dated 9 January 1970. Contract NAS1-7256	148.3 at third-stage separation	150.7 at third-stage separation
67	S-169C Orbital	1st Stage ALGOL IIB S/N 67 2nd Stage CASTOR II S/N 171 3rd Stage ANTARES II (X259-B3) S/N HIB-217 4th Stage ALTAIR III (FW-4S) S/N 2223-5	Standard Scout B launch vehicle.	34.0/-25.0 S/N A-53	All vehicle systems performed within specified limits. Payload placed in desired Earth orbit. Satisfactory	3-34100/SR-1, "Scout S-169C Final Flight Report," dated 17 January 1970. Contract NAS1-7256	178.5 at third-stage separation	179.1 at third-stage separation

TABLE XLV Continued - SUMMARY OF ALL SCOUT MISSIONS IN PHASES IV AND V.

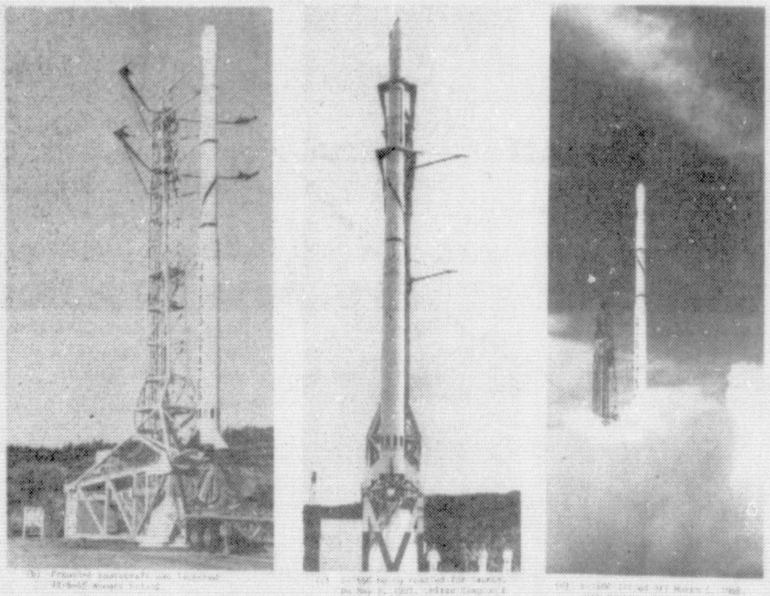
ORDER OF FIRING	VEHICLE NO. TYPE MISSION	CONFIGURATIONS MOTORS	CONFIGURATIONS VEHICLE	CONFIGURATIONS HEATSHIELD	FLIGHT SYNOPSIS	REFERENCES CONTRACT NO.	SPIN RATE rpm PREDICTED	SPIN RATE rpm ACTUAL
68	S-17[illegible]C Orbital	1st Stage ALGOL IIB S/N 75 2nd Stage CASTOR IIA S/N 184 3rd Stage ANTARES II (X259-B3) S/N RLB-219 4th Stage ALTAIR III (FW-4S) S/N 2223-9 Spin Motors: (2) 1.0 KS40 (2) 1.0 KS 75	Standard Scout A Launch Vehicle. First vehicle to incorporate roll and yaw compensation unit and the improved "D" section with increased spin bearing rotational joint stiffness.	34.0/-25.0 S/N A-55	All vehicle systems performed within specified limits, with the exception of the second-stage yaw left reaction control motor pressure switch registering a pressurized condition from the first yaw-left firing (approx. [illegible] seconds after stage ignition) through the sixth motor firing. First time experienced on Scout. Payload placed in desired earth orbit. Satisfactory.	[illegible]-R-1[illegible], "Scout S-17[illegible] Final Flight Report," dated [illegible] October 1970. Contract NAS1-7756	[illegible] At third stage separation	[illegible] At third stage separation
69	S-171C Re-entry	1st Stage ALGOL IIB S/N 72 2nd Stage CASTOR IIA S/N 176 3rd Stage ANTARES II (X259-B3) S/N RLB-221 4th Stage ALTAIR III (FW-4S) S/N 2224-9 Spin Motors: (2) 1.0 KS40 (2) 1.0 KS 75	Standard Scout B Launch Vehicle. Relocated 250VDC signal from connector J-36 to J-39 for third-stage instrumentation data.	34.0/-25.[illegible] S/N A-[illegible]	All vehicle systems performed as predicted. Nine data channels, including 3rd stage chamber pressure, exhibited signal shifts similar to chamber pressure anomalies experienced on previous flights (approx. 4.1 seconds after 3rd stage ignition). Spacecraft subjected to satisfactory re-entry environment and conditions. Satisfactory.	[illegible], "Scout S-171C Final Flight Report," dated [illegible] November 1970. Contract NAS1-7756	177.[illegible] At third stage separation	[illegible] At third stage separation
70	S-174C Orbital	1st Stage ALGOL IIB S/N 68 2nd Stage CASTOR IIA S/N 175 3rd Stage ANTARES II (X259-B3) S/N RLB-2[illegible]8 4th Stage ALTAIR III (FW-4S) S/N 2223-3 Spin Motors: (2) 0.6 KS 40 (2) 1.0 KS 75	Standard Scout B Launch Vehicle. Incorporated special instrumentation to investigate thrust of "C" section roll motors operating in the three-pound mode during third-stage coast. Relocated 250 VDC signal from connector J-36 to J-39 for third-stage instrumentation data, as on S-171C.	34.0/-25.0 S/N A-57	All vehicle systems performed within specified limits, except for premature separation of the spacecraft. The RMG [illegible] deployed approx. [illegible] seconds early, and the [illegible] separated from the 4th-stage/RMG approx. [illegible] seconds early. Experienced anomaly in longitudinal accelerometer data throughout flight - random intermittent shift. First time experienced on Scout. Six data channels, including 3rd stage chamber pressure, exhibited signal shifts similar to chamber pressure anomalies experienced on previous flights (approx. [illegible] seconds after 3rd stage ignition). Payloads placed in desired earth orbits. Satisfactory.	[illegible], "Scout S-174C Final Flight Report," dated [illegible] April 1971. Contract NAS1-[illegible]	[illegible] At third stage separation	[illegible] At third stage separation
71	S-17[illegible]C Orbital	1st Stage ALGOL IIB S/N 66 2nd Stage CASTOR IIA S/N 180 3rd Stage ANTARES II (X259-B3) S/N RLB-226 4th Stage ALTAIR III (FW-4S) S/N 2223-10 Spin Motors: (2) 1.0 KS 40 (2) 1.0 KS 75	Standard Scout B Launch Vehicle	34.0/-25.0 S/N A-61	Second Scout launch from mobile platform and second direct equatorial launch. All vehicle systems performed within specified limits. Third-stage chamber pressure anomaly, similar to that experienced on previous flights, occurred (approx. [illegible] seconds after third stage ignition). Spacecraft placed in satisfactory near-circular equatorial earth orbit. Satisfactory.	[illegible], "Scout [illegible] Final Flight Report," dated [illegible] June 1971. Contract NAS1-[illegible]	[illegible] At third stage separation	[illegible] At third stage separation
72	S-17[illegible]C Orbital	1st Stage ALGOL IIB S/N 74 2nd Stage CASTOR IIA S/N 182 3rd Stage ANTARES II (X259-B3) S/N RLB-224 4th Stage ALTAIR III (FW-4S) S/N 2223-14 Spin Motors: (2) 1.0 KS 40 (2) 1.0 KS 75	Standard Scout B Launch Vehicle.	34.0/-25.0 S/N A-5[illegible]	Third Scout launch from mobile platform and third direct equatorial launch. All vehicle systems performed within specified limits. Intermittent T/M signal midway thru 2nd-stage burn, loss of T/M data during most of 3rd-stage burn. Disturbance indicated on all three axes by data measurements during 3rd-stage coast for approx. [illegible] sec. This type of disturbance occurred on S-1[illegible]C. Spacecraft placed in satisfactory elliptical equatorial earth orbit. Satisfactory.	[illegible], "Scout S-17[illegible] Final Flight Report", dated [illegible] November 1971 Contract NAS1-[illegible]	[illegible] At third stage separation	[illegible] At third stage separation

TABLE XLV Continued - SUMMARY OF ALL SCOUT MISSIONS IN PHASES IV AND V.

ORDER OF FIRING	VEHICLE NO. / TYPE MISSION	CONFIGURATIONS			FLIGHT SYNOPSIS	REFERENCES / CONTRACT NO.	SPIN RATE rpm	
		MOTORS	VEHICLE	HEATSHIEAD			PREDICTED	ACTUAL
73	S-144CR RE-ENTRY	1st Stage Algol IIB S/N 77 2nd Stage Castor IIA S/N 185 3rd Stage Antares II (X259-B3) S/N HIB-225 4th Stage Altair III (FW-4S) S/N 2223-8 Spin Motors: (2) 1.0 KS 40 (2) 1.0 KS 75	Standard Scout B Launch Vehicle. Incorporated 42-inch diameter heatshield, larger Base "A" fin tip control surface (78 in.^{2} each compared with 45 in.^{2} each) and higher first-stage pitch and yaw control gains. Allowable dynamic pressure at second-stage ignition was reduced to 40 PSF. Incorporated special instrumentation for heatshield and some fourth-stage measurements.	42.0/45.0 S/N A-502	All vehicle systems performed as predicted. A spin rate of 1[illegible].5 rpm was originally predicted for a four 1.0KS75 spin motor configuration. However, two 1.0KS75 and two 1.0KS40 spin motors were inadvertently installed on this vehicle. Eight data channels, including 3rd-stage chamber pressure, exhibited a signal shift similar to chamber pressure anomalies experienced on previous flights (approx. 10.34 seconds after 3rd-stage ignition). Payload subjected to acceptable re-entry environment and conditions. Satisfactory.	3-34100/1R-81 "Scout S-144CR Final Flight Report" Dated 17 December 1971. Rev. A Dated 25 February 1972, Rev. B Dated 20 April 1972 Contract NAS1-10000	124.5 at Third-Stage Separation	124.0 at Third-Stage Separation
74	S-177C ORBITAL	1st Stage Algol IIB S/N 76 2nd Stage Castor IIA S/N 181 3rd Stage Antares II (X259-B3) S/N HIB-223 4th Stage Altair III (FW-4S) S/N 2223-7 Spin Motors: (2) 1.0 KS 40 (2) 1.0 KS 75	Standard Scout B Launch Vehicle. Incorporated two special sensors in "D" section instrumentation system to measure ignition battery current. Incorporated "E" section instrumentation system, and added special switches to determine separation clamp release and spring actuation at payload separation.	34.0/-25.0 S/N A-59	All vehicle systems performed within specified limits, and special instrumentation performed satisfactorily. Disturbances were recorded at three separate times on all three axes, during 4th-stage coast, having a duration of from 2 to 34 seconds. Oscillatory in nature. Were not detrimental to mission or trajectory. Seven data channels exhibited a signal shift similar to the 3rd-stage chamber pressure anomalies experienced on previous flights (approx. 6.24 seconds after 3rd-stage ign.) Payload placed in desired Earth orbit. Satisfactory.	3-34100/2R-5 "Scout S-177C Final Flight Report" Dated 23 February 1972 Rev. A, dated 18 August 1972 Contract NAS1-10000	139.2 at Third-Stage Separation	144.2 at Third-Stage Separation
77	S-163CR ORBITAL	1st-Stage ALGOL IIB S/N 69 2nd-Stage CASTOR IIA S/N 173 3rd-Stage ANTARES II (X259-B3) S/N HIB-30[illegible] 4th-Stage ALTAIR III (FW-4S) S/N 2223-16 Spin Motors: (2) 0.6 KS 40 (2) 1.0 KS 40	Standard Scout B Launch Vehicle. Incorporated "E" section payload separation system. Incorporated longer 34-inch diameter heatshield.	34.[illegible]/-40.[illegible] S/N A-40[illegible]	Fourth Scout launch from mobile platform and fourth direct equatorial launch. All vehicle systems performed within specified limits. Experienced loss of telemetry data from 163.2 seconds (6.76 seconds after 3rd-stage ignition) to 283.5 seconds of flight time (35.3 seconds after 3rd-stage burnout). Spacecraft placed into planned elliptical equatorial Earth orbit. Satisfactory.	3-34100/2R-2[illegible], "Scout S-163CR Final Flight Report," Dated 24 May 1972 Contract NAS1-10000	126.1 at Third-Stage Separation	13[illegible].4 at Third-Stage Separation



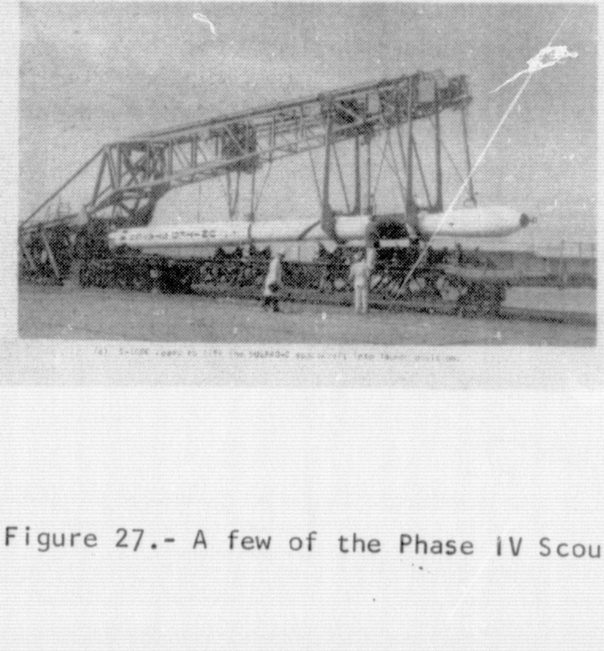
(a) [illegible]



(b) [illegible]

(c) [illegible]

(d) [illegible]



(e) [illegible]

Figure 27.- A few of the Phase IV Scouts.

Figures 28 and 29 give the Scout success ratio for each of the phases. More detail is given in section VI.

Figure 30 shows the increase of Scout capability with the development of improved motors.

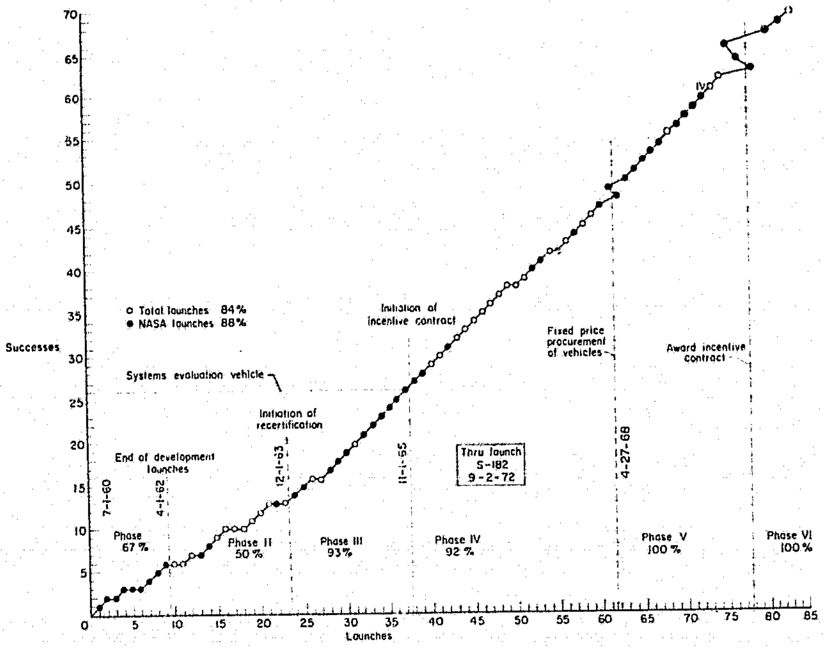


Figure 28.- Scout vehicle launch record

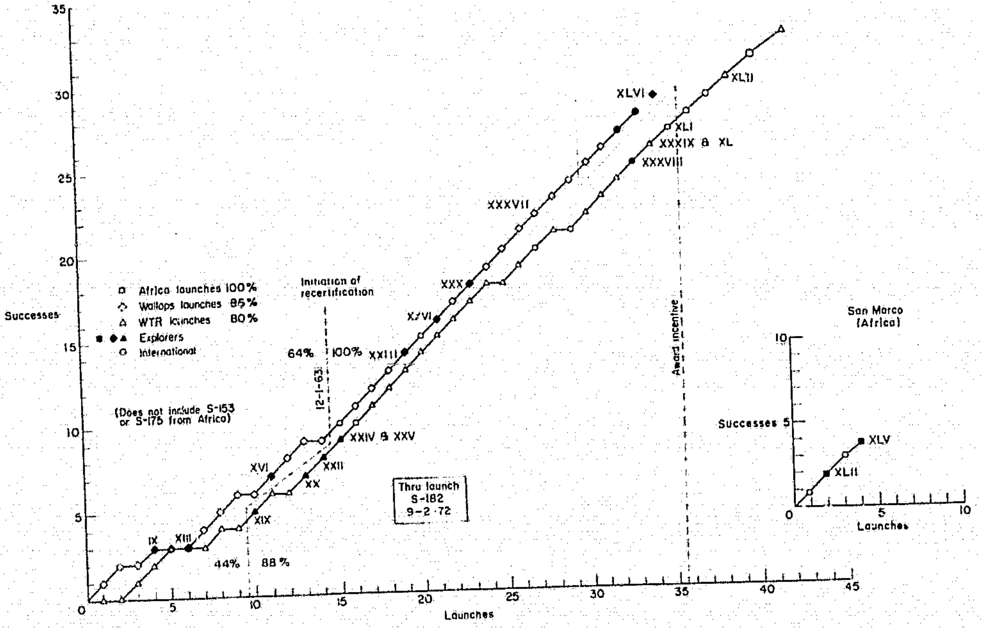


Figure 29.- Scout vehicle site launch record

C-2

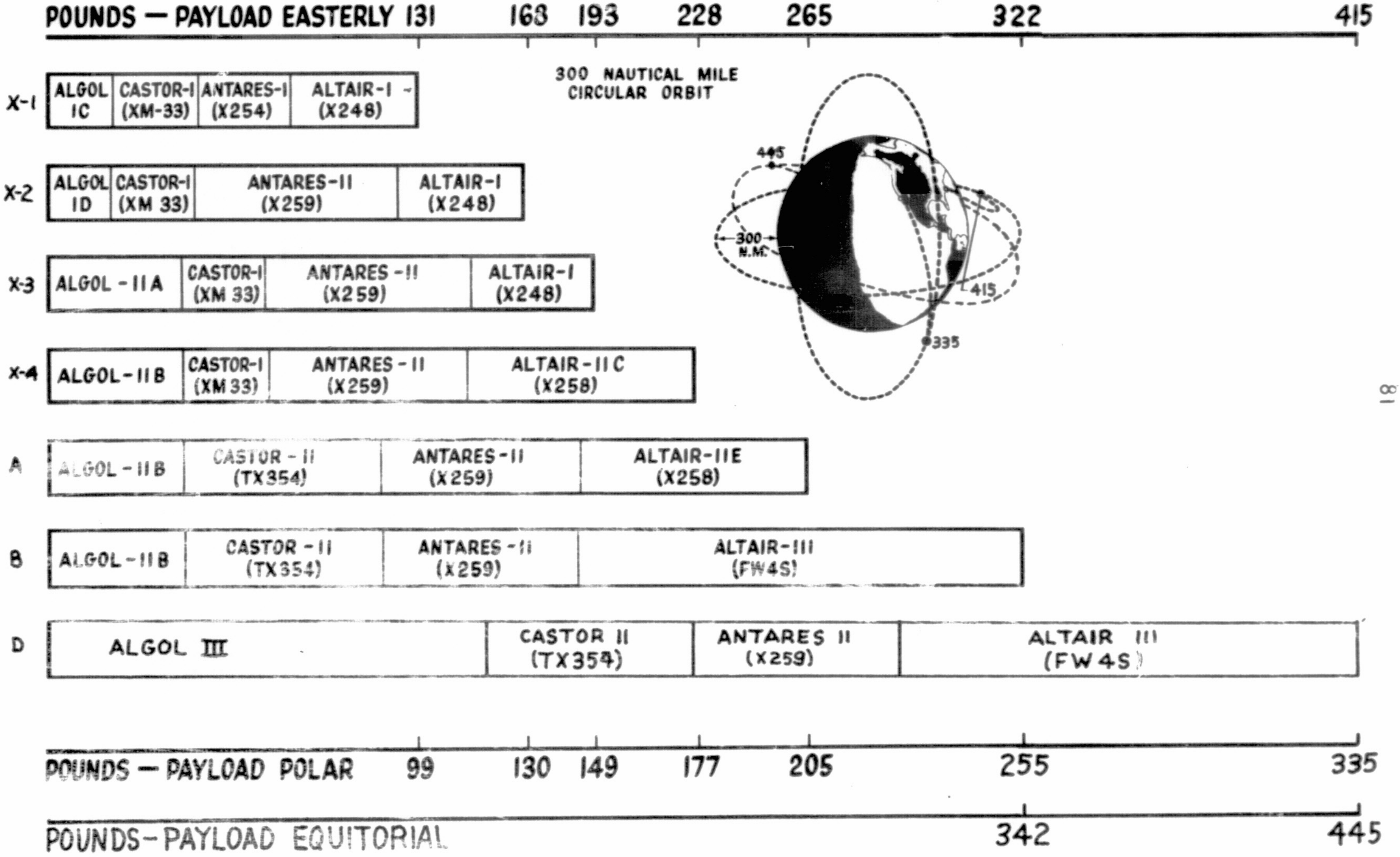


Figure 30.- Scout orbital capability.

Figure 31 illustrates the OV3-4 Air Force payload launched on vehicle S-147C. This Air Force research satellite was launched on June 9, 1966 at Wallops Island. The 170-pound satellite carried simulated human tissue shaped into spheres of varying sizes to record the effects of space radiation and tell scientists how much radiation damage an astronaut's body would undergo in a similar manned flight. The satellite was placed in an elliptical orbit which placed it into the inner Van Allen radiation belt.

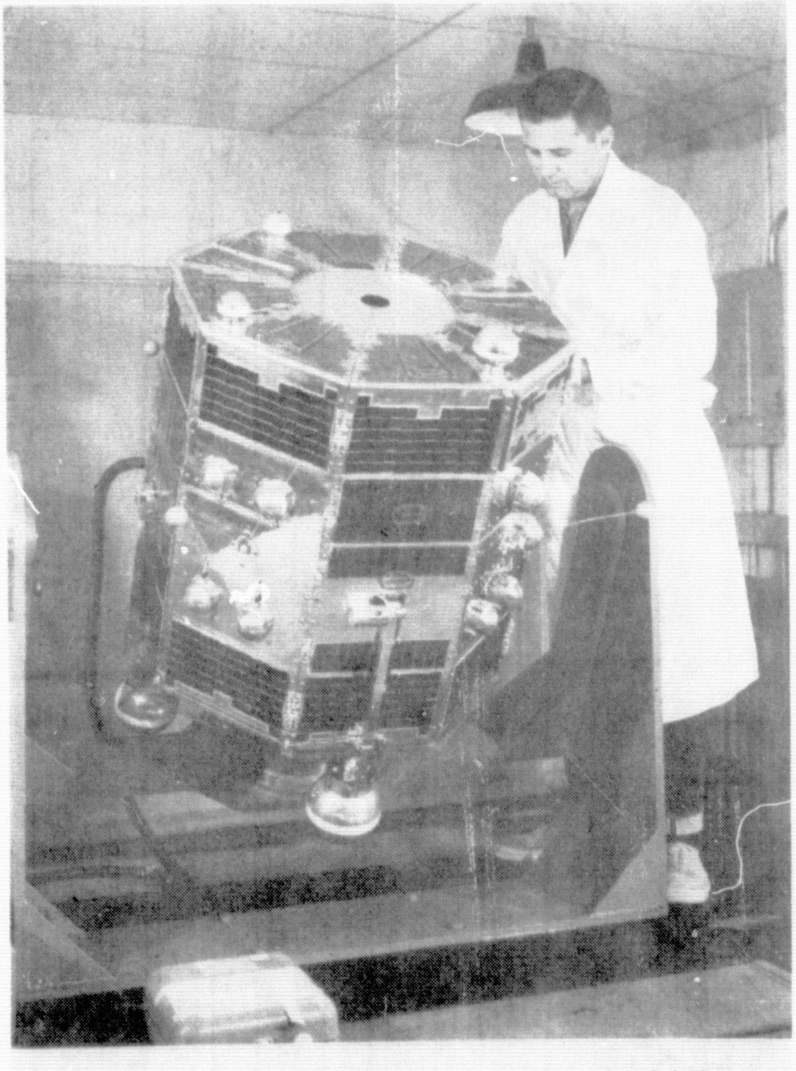


Figure 31.- Air Force payload OV3 launched on vehicle S-147C.

SECTION II - SCOUT FUNDING

The Scout program has been funded by four government agencies, the Navy, the Air Force, the Atomic Energy Commission, and the National Aeronautics and Space Administration. Also three European countries, United Kingdom, Netherlands, Germany, and the European Space Research Organisation have purchased Scout hardware and services. Italy has purchased services only. After the missions are approved (see table XLVI) fiscal year funds are authorized as indicated in table XLVII, which also lists

TABLE XLVI - SCOUT LAUNCHES.

1960 (3)
LRC-TEST (W)
AFSW-C (W)
S-56-A (W)

1961 (4)
S-56-B (W)
S-55 (W)
S-55A (W)
P21 (W)

1962 (8)
RE-A (W)
P21-A (W)
SOLRAD-A (V)
AF-1 (W)
RE-B (W)
AF-2 (V)
S-55-B (W)
NA-1 (V)

1963 (9)
AF-3 (V)
NA-2 (V)
AF-4 (V)
RFD-1 (W)
AF-A (V)
NA-3 (V)
RE-C (W)
AF-5 (V)
ADIE-A (W)

1964 (11)
UK-C (W)
AF-B (V)
NA-4 (V)
SERT-1 (W)
RE-D (W)
S-48 (V)
RFD-2 (W)
S-66-B (V)
S-55-C (W)
ADIE-B (V)
SM-A (W)

1965 (5)
S-66 (W)
SEV-SECOR (W)
SOLRAD-B (W)
FR-A (V)
NA-5 (V)

1966 (9)
NA-6 (V)
RE-E (W)
NA-7 (V)
OV3-1 (V)
NA-8 (V)
OV3-4 (W)
OV3-3 (V)
NA-9 (V)
OV3-2 (V)

1967 (9)
OV-3-5 (V)
NA-10 (V)
SM-B (A)
ESRO-IIA (V)
UK-E (V)
NA-11 (V)
NA-12 (V)
RAM-C-A (W)
OV3-6 (V)

1968 (7)
SOLRAD-C (W)
NA-13 (V)
RE-F (W)
ESRO-IIB (V)
RAM-C-B (W)
ADIE-C (V)
ESRO-1A (V)

1969 (2)
ESRO-1B (V)
GRS-A (V)

1970 (4)
NA-14 (V)
RAM-C-C (W)
OFO-A (W)
SAS-A (A)

1971 (7)
SM-C (A)
PAET (W)
SOLRAD-D (W)
GRP-A (W)
SSS-A (A)
UK-4 (V)
CAS-A (W)

1972 (5)*
MTS-A (W)
NA-15 (V)
ESRO-IV (V)
SAS-B (A)
AEROS-A (V)

1973 (1)*
NA-16 (V)

1974 (6)*
SM-C2 (A)
NPE-A (V)
UK-X4 (V)
AEROS-B (V)
UK-5 (A)
ANS-A (V)

1975 (5)*
SAS-C (A)
GP-A (W)
NA-17 (V)
DAD-A (V)
NA-18 (V)

1976 (8)*
UK-6 (W)
NA-19 (V)
NA-20 (V)
SM-D (A)
OFO-B (W)
SAGE-A (W)
HCMM-A (W)
NA-21 (V)

1977 (7)*
NA-22 (V)
BIO-B (W)
NA-23 (V)
NA-24 (V)
SATS-B (W)
SAS-E (A)
ANS-B

1978 (6)*
SCS-A
NA-25 (V)
NA-26 (V)
DAD-B (V)
EW-A (V)
ROS-A

1979 (6)*
BES-A
NA-27 (V)
NA-28 (V)
ICE-A
ATCE-A
MIFE-A

1980 (6)*
APL-MPI
SAR-A
CRE-A
SNE-A
X-RAE-A
SMTV-A

(A) Africa, (V) WTR/Vandenberg AFB, (W) Wallops Island.
*Estimated for Advanced Planning.

other statistical data for all the phases IV and V launches. The vehicles have been allocated to the users as shown in table XLVIII. The cost of the Scout hardware (490-01) has been assigned to the NASA users as shown in table XLIX and Table L for the reimbursable missions. The NASA users also include all cooperative programs using a Scout vehicle.

TABLE XLVII - SCOUT ASSIGNED MISSIONS

VEHICLE	FY FUND	EXPERIMENT	CONFIGURATION	LAUNCH NUMBER	LAUNCHED
*PHASE IV (November 1965 through Mar. 1968)					
138C	65	SOLRAD-B, Explorer XXX	X-4	38	11-18-65
139C	65	French-A	X-4	39	12-06-65
140C	62R	Navy-5	A	40	12-12-65
141C	65	Reentry-E (Materials)	X-4A	42	2-9-66
142C	62R	Navy-6	A	41	1-28-66
143C	62R	Navy-7	A	43	3-25-66
144CR	7C-1	PAET-A	B	73	6-20-71
145C	62R	Air Force - OV3-1	B	44	4-22-66
146C	63R	Navy-8	A	45	5-18-66
147C	62R	Air Force - OV3-4	B	46	6-09-66
148C	62R	Air Force - OV3-3	B	47	8-04-66
149C	63R	Navy-9	A	48	8-17-66
150C	62R	Air Force - OV3-2	B	49	10-28-66
151C	65R	Air Force - OV3-5	B	50F	1-31-67
152C	66	ESRO-IIA	B	55	5-29-67
153C	65	San Marco-B	B	52F	4-26-67
154C	65R	Navy-10	A	51	4-13-67
155C	66	United Kingdom-E	A	53	5-5-67
156C	66R	Navy-11	A	54	5-18-67
157C	67R	Navy-12	A	56	9-25-67
158C	66R	Air Force - OV3-6	B	58	12-4-67
159C	66	RAM-C-A	B	57	10-19-67
160C	66	SOLRAD-C	B	60	3-5-68
161C	67	ESRO-IIB	B	62	5-16-68
162C	67R	Navy-13	A	59	3-1-68
PHASE V (April 1968 through June 1971)					
163R	72	SSS-A	B	77	11-15-71
164	68	Reentry-F	X-5C	61	4-27-68
165	68	ADIE-C Explorers XXXIX and XL	B	63	8-8-68
166	70	GRP-A	B	76	9-20-71
167	67	ESRO-IA	B	65	10-3-68
168	67	RAM-C-B	B	64	8-22-68
169	69	GRS-A-I	B	67	11-7-69
170	73	SAS-B	D	81	11-16-72
171	68	RAM-C-C	B	69	9-30-70
172	70R	ESRO-IB	B	66	10-1-69
173	68	San Marco-C	B	72	4-24-71
174	71	Orbiting Frog Otolith-A	B	70	11-16-70
175	69	SAS-A	B	71	12-12-70
176	67R	Navy-14	A	68	8-27-70
177	70	SOLRAD-D	B	74	7-8-71

---

*Preceding data in Phases I, II, and III.
R-Reimbursable.

TABLE XLVIII - SCOUT PRODUCTION VEHICLES

FISCAL YEAR FUNDED		LAUNCHED**	COMPLETED PHASES I, II, III	AUTHORIZED					
				66	67	68	69	70	71
OAST (15)									
(3)	Micrometeoroid, S-55	(3)	3						
(1)	OFO	(1)							1
(1)	Planetary - Reentry (Ames)	(1)						1	
(3)	RAM-C Reentry	(3)		1	1	1			
(6)	Reentry	(6)	5			1			
(1)	SERT	(1)	1						
OSS (22)									
(3)	Air Density/Injun Explorer	(3)	2			1			
(2)	Beacon Explorer, S-66	(2)	2						
(1)	Ionosphere Explorer S-48	(1)	1						
(3)	NRL - SOLRAD	(3)	1	1				1	
(1)	SAS (X-ray)	(1)					1		
(1)	SEV	(1)	1						
(3)	ESRO (Also See Reimbursable)	(3)		1	2				
(1)	France (FR-1A)	(1)	1						
(2)	Germany	(2)					1	1	
(3)	Italy (San Marco)	(3)	2			1			
(2)	United Kingdom	(2)	1	1					
REIMBURSABLES									
DOD* (38)									
(9)	Air Force	(9)	8	1					
(29)	Navy	(15)	12	1	8	6			2
AEC (2)									
(1)	Navy Supplied	(1)	1						
(1)	NASA Supplied	(1)	1						
INTERNATIONAL - TRUST FUND (1)									
(1)	ESRO	(0)						1	
(78)		(63)	42	6	11	10	2	4	3

---

*Does not include direct DOD-procured Scouts.

**Through Scout S-177. (Does not include 7 development launches.)

TABLE XLIX -

SCOUT VEHICLE PRICEOUT (490) - SCOUT PRODUCTION VEHICLES (89) THROUGH FY71 (Millions Dollars)

-01 - VEHICLE HARDWARE	VEHICLE NUMBER	DELIVERY QUARTER	FY65 & PRIOR	FISCAL YEAR 66	67	68	69	70	71	TOTAL
OAST - MISSIONS		CY	(9)	(1)	(1)	(2)	(0)	(1)	(1)	(15)
(3) Micrometeoroid S-55 (713)		****								2.959
#A	ST6	3-61	0.883							
B	115	4-62	0.976							
C	133	4-64	1.1							
(1) Orbiting Frog Otolith (735)										1.2
A	174	4-70							1.2	
(1) Planetary Atmosphere Explorer Test										1.184
A (AMES)	144	2-71					0.184	0.7	0.3	
(3) Radio Attenuation Measurements (RAM-C)(730)										3.584
A	159	4-67		1.1			0.084			
B	168	3-68			1.1		0.1			
C	171	3-70				0.8	0.4			
(6) Reentry (711)										6.576
#A (R-1)	ST8	1-62	0.921							
B (R-2)	114	3-62	0.969							
C (R-3)	110	3-63	1.002							
D (R-4)	129	3-64	1.1							
E (R-E)	141	1-66	1.1				0.084			
F	164	2-68				1.1	0.3			
(1) SERT-1 (704)										1.1
A	124	3-64	1.1							
(15) OAST TOTAL			9.151	1.1	1.1	1.9	1.152	0.7	1.5	16.603
PHYSICS & ASTRONOMY	(P & A)		(6)	(1)	(0)	(1)	(1)	(1)	(0)	(10)
(3) Air Density (863)										3.4
A	122	4-63	1.1							
B	135	4-64	1.1							
C	165	3-68				1.1	0.1			
(2) Beacon Explorer-S66 (873)										2.2
B	123	4-64	1.1							
C	136	2-65	1.1							
(1) Ionosphere Explorer - S48 (853)		****								1.1
A	134	3-64	1.1							
(1) Small Astronomy Satellites (SAS)(851)(857)										1.3
A - X-ray	175	4-70					1.2	0.1		
(0) Small Scientific Satellites (SSS)(851)(857)										0.1
A - Energetic Particles	163	9-71							0.1	
(0) CRL - Explorer										0.0
A (MSS) Canceled										
(3) SOLRAD (NRL)(858)										3.608
B	138	4-65	1.1				0.1		0.004	
C	160	1-68		1.1			0.1		0.004	
D	177	2-71						1.2		
(10) PHYSICS & ASTRONOMY TOTAL			6.6	1.1	0.0	1.1	1.5	1.3	0.108	11.708

#Traded for ST vehicle.
****Complete.

TABLE XLIX Continued -

SCOUT VEHICLE PRICEOUT (490) - SCOUT PRODUCTION VEHICLES (89) THROUGH FY71 (Millions Dollars) Continued

	-ul VEHICLE HARDWARE	VEHICLE NUMBER	DELIVERY QUARTER	FY65 & PRIOR	FISCAL YEAR 66	67	68	69	70	71	TOTAL
	OSS - INTERNATIONAL (P & A)			(4)	(2)	(2)	(1)	(1)	(1)	(0)	(11)
(3)	ESRO (871)										3.654
	IIA	152	2-67		1.1			0.111			
	IIB	161	2-68			1.1		0.042		0.051	
	IA	167	4-68			1.1		0.100		0.050	
(1)	French (EOLE) (876)		****								1.193
	1	139	4-65	1.1				0.093			
(2)	German (87[illegible])										2.4
	A GRS-A-1 (AZUR)	169	4-69					0.6	0.6		
	B GRP-A	166	2-71						1.2		
(3)	San Marco (894).										4.102
	A	137	4-64	1.1							
	B	153	2-67	0.6	0.5			0.111			
	C	173	2-71			0.3	0.8	0.1	0.091		
	(Checkout)	144	----		0.5						
(2)	United Kingdom (870)										2.291
	C	127	1-64	1.1							
	E	155	2-67		1.1			0.091			
(11)	INTERNATIONAL TOTAL			3.9	3.2	2.5	0.8	1.248	1.891	0.101	13.640
(21)	OSS TOTAL			10.5	4.3	2.5	1.9	2.748	3.191	0.209	25.348
(36)	01 - VEHICLE HARDWARE TOTAL			19.651	5.4	3.6	2.7	3.800	3.891	1.709	41.951
(1)	02 - SUPPORT ACTIVITY			19.327	6.152	4.815	4.815	7.954	7.664	9.597	60.360
	02 - OSS DIRECT - SERVICES			0.099	0.100	0.0	0.073	0.109	0.665	0.659	1.705
(7)	03 - PRODUCT IMPROVEMENT			1.542	0.048	0.970	1.476	0.637	1.571	1.144	7.388
	TOTAL NASA SCOUT 490 AND 497			40.619	11.700	9.385	10.200	12.600	13.791	13.109	111.404
	REIMBURSABLE - TRUST FUND										
(2)	ESRO			0	0	0	0	0	1.912	1.850	3.762
(1)	San Marco			0.68	0	0.03	0	0.048	0.250	0.000	1.008
(3)				0.68	0	0.03	0	0.048	2.162	1.850	4.770
	REIMBURSABLE - DOD										
(1)	AEC		954	2.398	0	0	0	0	0	0	2.398
(8)	Air Force		62-6	9.690	0.64	0.523	0	0.270	0	0	11.123
(5)	Air Force		63-32	1.944	0	0	0	0	0	0	1.944
(0)	Air Force		65-42	0.20	0.20	0	0	0	0	0	0.400
(5)	Navy		Direct	9.703	0	0	0	0	0	0	9.703
(8)	Navy/Air Force		63-29	6.160	1.086	0	0	0.217	0	0	7.463
(5)	Navy/Air Force		66-95	0	0	11.433	6.88	0	1.151	4.463	23.927
(32)	REIMBURSABLE DOD TOTAL			30.095	1.926	11.956	6.880	0.487	1.151	4.463	56.958
	TOTAL SCOUT 490			69.194	13.626	21.371	15.980	13.035	17.104	19.422	169.732

****Complete.

TABLE L - SCOUT VEHICLE PRICEOUT (490) - SCOUT PRODUCTION VEHICLES (89) THROUGH FY71 (Millions Dollars)

	-01 - VEHICLE HARDWARE	VEHICLE NUMBER	FY65 & PRIOR	FY AUTHORIZED						TOTAL
				66	67	68	69	70	71	
	REIMBURSABLES		(21)	(2)	(8)	(6)	(0)	(1)	(3)	(41)
(9)	AIR FORCE		(8)	(1)						(9)
(2)	62-6	(113) (128)	3.14							3.14
(6)	OV3	(145) (147) (148) (150) (151) (158)	5.75	0.64	0.523		0.27			7.183
(1)	63-32	(132)	1.39							1.39
	Support Dir. Scouts (4)		0.554							0.554
	Support (62-6, 65-42)		1.000	0.20						1.20
(30)	NAVY		(12)	(1)	(8)	(6)	(0)	(0)	(3)	(30)
	Support (R-7000)		1.5							1.50
**(5)	R-7000 Series	(111) (116) (118) (119) (120)	6.7							6.70
		GSE	1.50							1.50
(0)	R65-34-174		0.003							0.003
(0)	R71-F0-921								0.003	0.003
**(1)	63-29-2a*	(125)	1.586							1.586
**(7)	63-29-14a*	(140) (142) (143) (146) (149) (154) (156)	4.574	1.086			0.377			6.037
	Field Team-WTR	1969					-0.16			-0.16
(5)	66.95* ++	(157) (162) (176) (178)●(182)●			11.433	6.88		1.151	4.463	23.927##
	Field Team-WTR	1967			-0.21					-0.21
	Field Team-WTR	1968				-0.16				-0.16
	Field Team-WTR	1970							-0.13	-0.13
**(1)	A.E.C.		(1)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
	Support		0.03							0.03
	RFD-2		2.368							2.368
(6)	INTERNATIONAL#		(0)	(0)	(0)	(0)	(0)	(1)	(0)	(1)
	AEROS-B	(186)●(3-74)								0.0
	**ESRO IB	(172) (4-69)						1.862	0.350	2.212
	ESRO IV	(185)●(3-72)						0.050	1.500	1.550
	San Marco	Hardware	0.68		0.03		0.048	0.25		1.008
	UK-X4	(188)●(1-74)								0.0
	UK-X5	S/M Range								0.0
	UK-X6	(197)o(4-76)								0.0
(46)	TOTAL REIMBURSABLES		30.775	1.926	11.776	6.72	0.535	3.313	6.186	61.231

NOTE: S-166/Navy vehicle had an A.E.C. Payload.
#Trust Fund.
*Received as Air Force Funds.
●Inventory Phases V and VI.
oPhase VII Production
xPhase VIII Production.
**Complete.
##Advanced funding for 68-F-0071 included.
++Finalized in FY74 at 17.551

TABLE LI - SCOUT VEHICLE PRICEOUT (490) - SCOUT PRODUCTION VEHICLES (89) THRU FY 71 (Million Dollars)

OSS-SV

02 - SUPPORTING ACTIVITY	FY65 & PRIOR	66	67	68	69	70	71	TOTAL
(1) Evaluation Vehicle***								(1)
A - Vehicle No. 131 (Del. Qtr. 3-65)	0.500							
Incentive				0.368	0.500		0.425	
Field Services (N & J)	3.637	1.822	0.766	1.109	0.489	0.955	1.477	
G.S.E. and LRC	1.298	0.022	0.028	0.057	0.237	0.182	0.314	
Supporting Services - LRC	8.870	3.054	2.329	2.056	5.329	5.309	6.104	
DCASO (OSS)				0.073	0.109	0.118	0.112	
Supporting Services - OSS	0.099	0.100						
San Marco (OSS)						0.547	0.547	
Wallops	1.45	0.148	0.556	0.104	0.007	0.107	0.090	
GSFC, PLOO, KSC, Etc.	0.534	0.078	0.055	0.068	0.060	0.076	0.120	
Systems Engineering (E)	3.038	1.028	1.081	1.089	1.332	1.035	1.067	
02 - SUPPORTING ACTIVITY TOTAL	19.426	6.252	4.815	4.924	8.063	8.329	10.256	62.065
03 - PRODUCT IMPROVEMENT								
First Stage				0.001		1.060	1.129	
Algol Nozzle***	0.438	0.032	0.114	1.474	0.247			
Castor Nozzles and Motor***	0.318							
Third Stage**	0.527							
Upper Stage Control	0.245							
Fifth Stage		0.016	0.856	0.001	0.104	0.029		
#Large Heat Shield						0.344	0.003	
Torquing Yaw Gyros***	0.014							
Command Destruct							0.007	
S-Band (Frequency Change)					0.286	0.198	0.005	
03 - PRODUCT IMPROVEMENT TOTAL	1.542	0.048	0.970	1.476	0.637	1.571	1.144	7.388
SUMMARY								
01 - VEHICLE HARDWARE TOTAL	19.651	5.4	3.6	3.8	3.9	3.891	1.709	41.951
02 - SUPPORTING ACTIVITY TOTAL	19.426	6.253	4.418	5.692	7.751	8.525	10.000	62.065
03 - PRODUCT IMPROVEMENT TOTAL	1.542	0.047	1.367	0.708	0.949	1.375	1.400	7.388
TOTAL NASA (490 and 497)	40.619	11.700	9.385	10.200	12.600	13.791	13.109	111.404
VEHICLES								
(LAUNCHED)								
(15) OAST	(9)	(1)	(1)	(2)	(0)	(1)	(1)	(15)
(11) OSS-P & A (International)	(4)	(2)	(2)	(1)	(1)	(1)	(0)	(11)
(12) OSS-P & A	(6)	(1)	(0)	(1)	(1)	(1)	(0)	(10)
(1) OSS-Support	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
*(39) TOTAL NASA	(20)	(4)	(3)	(4)	(2)	(3)	(1)	(37)
REIMBURSABLE								
**(9) AIR FORCE	(8)	(1)	(0)	(0)	(0)	(0)	(0)	(9)
***(16) NAVY	(12)	(1)	(8)	(4)	(0)	(0)	(3)	(28)
(1) AEC	(1)	(0)	(0)	(0)	(0)	(0)	(0)	(1)
(1) INTERNATIONAL	(0)	(0)	(0)	(0)	(0)	(1)	(1)	(2)
(27) TOTAL REIMBURSABLES	(21)	(2)	(8)	(4)	(0)	(1)	(4)	(40)
(66) TOTAL VEHICLES								(77)

#Includes direct OSS.
*Does not include 7 development vehicles.
**Does not include 4 Air Force Scouts - direct purchase.
***Includes the first AEC launch on Navy Scout.

The (490-02) program of software launch services and support costs are itemized for each fiscal year in table LI. The major (490-03) and minor product improvement programs for the Scout program are also included in table LI. The funds in tables XLIX through LI are for the quantity of Scout vehicles listed at the bottom of table LI and also on top of table LII.

Table LII also shows the rate of launches as well as the contractual coverage. The funding authority (506) received at the Langley Research Center for the Scout program is itemized in table LIII. This table also includes funds for the Scout Project Office, but not for the Scout program. These funds were mostly for quantity buying of solid propellant motors (stages of the Scout vehicle) for other DOD and NASA programs. The type of funds received for the Scout program are as follows:

Development - 890 and 904-03
Software and Systems Engineering - 497 and 490-02
Supporting Technology - 180 and 680
International - 894 and 490-04
Subauthorizations - Funds from other Centers for Support.

TABLE LII - SCOUT VEHICLES FUNDED (Fiscal Year)

	FY 1965 & Prior	1966	1967	1968	1969	1970	1971	TOTAL
DEVELOPMENT	7							7
NASA	20	4	3	4	2	3	1	37
NAVY (for AEC)	1							1
(Direct)	4							4
(via A.F.)	7	1	8	4			3	23
AIR FORCE ⊛	8	1						9
AEC	1							1
INTERNATIONAL	—	—	—	—	—	1	1	2
TOTAL	48**	6	11	8	2	4	5	84
SCOUT VEHICLES CONTRACTED (Fiscal Year)								
HARDWARE	58		15	15				88
CHECKOUT AND DELIVERY (123, 144, 170 & 178 twice)	35	15	18	(-4)	13	(-1)	14	90
SCOUT VEHICLES LAUNCHED (Fiscal Year)								
NASA	22	4	3	5	3	1	5	43
ESRO						1		1
AEC	2*							2
DOD	8	6	6	2			1	23
NON-LRC PROCURED	4	—	—	—	—	—	—	4
TOTAL	36	10	9	7	3	2	6	73
VEHICLES UNDER CONTRACT	131	16	22	30	27	25	19	

---

*(116) Navy transferred to AEC.
**SEV also authorized but not funded (development vehicle used).
⊛ Does not include four Air Force Scouts - Direct Purchase

TABLE LIII - SUMMARY OF SCOUT PROJECT OFFICE AUTHORITY (506)
(LANGLEY RESEARCH CENTER)

F.Y.	Scout NASA Funds: 890 Development	Scout NASA Funds: 490 Procurement	Scout NASA Funds: Received, Suballotment	Scout NASA Funds: (497) SEAM	Reimbursable Funds (490): AEC	Reimbursable Funds (490): A.F. (890) Development	Reimbursable Funds (490): A.F. Procurement	Reimbursable Funds (490): Navy Procurement	Total
STG(MSC) 1965 & Prior	$ 3,810,488								$ 3,810,488
LRC 1965 & Prior	19,339,002	$29,625,285	$295,965	$10,894,526	$2,397,564	$500,000	$27,147,495	$9,703,348	$ 99,903,18
1966	19,339,002	7,600,000	84,247	3,999,954			2,025,848		13,710,049
1967		5,399,602	3,975	3,985,091			11,991,000		21,379,668
1968		5,163,000		4,963,990			7,463,075		17,590,065
1969		12,490,988	205,000				484,534		13,180,522
1970		13,034,931					1,020,931		14,055,862
1971		12,541,000					1,613,355	2,600	14,156,955
TOTAL	$23,149,490	$85,854,875	$589,187	$23,843,561	$2,397,564	$500,000	$51,746,238	$9,705,948	$197,786,863

(LANGLEY RESEARCH CENTER)

F.Y.	San Marco 894: Cooperative NASA	San Marco 894: Trust Fund Italy	San Marco 894: Trust Fund ESRO IB	San Marco 894: Trust Fund ESRO IV	Advanced Studies (680)	Technology (SRT) (180)	C of F Funds*: LRC	C of F Funds*: Suballotment	TOTAL
1965 & Prior	$2,707,924	$680,465				$1,220,590	$1,433,131	$28,000	$6,070,110
1966	350,000					890,000			1,240,000
1967	100,000	29,673				650,000			779,673
1968	70,000					401,000			471,000
1969		48,009				414,000			462,009
1970		250,000	$1,861,910	$ 50,000		622,000			2,783,910
1971			350,000	495,000	$200,000	289,653			1,334,653
Total	$3,227,924	$1,008,147	$2,211,910	$545,000	$200,000	$4,487,243	$1,433,131	$28,000	$13,141,355

(OSS)

F.Y.	DIRECT FUNDS: NASA	DIRECT FUNDS: AIR FORCE	TOTAL
1965 & Prior	$3,725,700		$3,725,700
1966	100,000		100,000
1967		$210,372	210,372
1968	73,000	164,200	237,200
1969	109,000	170,459	279,459
1970	665,000	134,250	799,250
1971	659,000		659,000
TOTAL	$5,331,700	$679,281	$6,010,981

TOTAL ALL FUNDS $216,939,199

*Totals do not include direct OSS obligations.

The Systems Engineering funds received through FY 1968 were designated 497 and are listed in table LIV. After 1968 only 490-02 funds were received for supporting activities and launch services.

The NASA funds received by the Scout Project Office were for the launches of the missions listed in table LV. Tables III, IV, V, XLV, XLVI, and XLVII list all missions including NASA missions, whereas table LV is NASA missions only.

The allotments listed in table LIII are detailed in LVI. These funds include the costs to maintain the Scout Launch Complex. The Wallops Island Scout launch complex is shown in figure 32.

TABLE LVI - ALLOTMENTS

DEVELOPMENT FUNDS (890)

NASA-Phase I	$22,143,294.00
NASA-Phase II	1,014,155.03
Air Force 63(63-20)*	500,000.00
TOTAL	$23,657,449.03
C OF F FUNDS (5315)	$ 1,433,133.43

PROCUREMENT FUNDS

NASA FUNDS (490-004)

Phases I, II, III	$29,625,284.92

Date	Type	Amount
6-18-65	66	$ 1,500,000.00
8-18-65	66	-100,000.00
11-22-65	66	4,350,000.00
5-17-66	66	1,850,000.00
Subtotal FY 1966		$ 7,600,000.00
7-7-66	67	$ 3,000,000.00
8-29-66	67	3,400,000.00
12-21-66	67	-1,000,000.00
4-24-70	67	-398.00
Subtotal FY 1967		$ 5,399,602.00
7-6-67	68	$ 1,000,000.00
8-2-67	68	2,000,000.00
11-16-67	68	1,897,000.00
5-27-68	68	266,000.00
Subtotal FY 1968		$ 5,163,000.00
7-1-68	69	$ 3,000,000.00
11-6-68	69	6,000,000.00
12-23-68	69	3,491,000.00
3-21-72	69	-12.00
Subtotal FY 1969		$12,490,988.00
Suballotment-WTR		-24,788.00
LRC Allotment		$12,466,200.00
7-8-69	70	$ 7,660,000.00
10-27-69	70	5,382,000.00
6-3-70	70	-7,000.00
4-25-73	70	-69.00
Subtotal FY 1970		$13,034,931.00
Suballotment-WTR		-50,000.00
Suballotment-Wallops		-85,000.00
LRC Allotment		$12,899,931.00
6-29-70	71	$ 3,600,000.00
10-23-70	71	7,000,000.00
1-14-71	71	941,000.00
4-26-71	71	1,000,000.00
Subtotal FY 1971		$12,541,000.00
Suballotment-Wallops		-75,000.00
Suballotment-WTR		-50,000.00
LRC ALLOTMENT		$12,416,000.00
TOTAL NASA (490)		$85,854,805.92

DIRECT NASA OSS

C of F FUNDS	$ 1,200,000.00
(890) DEVELOPMENT	2,427,000.00
(490) PLOO	98,700.00
(490) FY66	100,000.00
(DCASO) FY68	37,000.00
(DCASO) FY69	109,000.00
(DCASO) FY70	118,000.00
(DCASO) FY71	112,000.00
(490) SAN MARCO FY70	547,000.00
SAN MARCO FY71	547,000.00
(497) (DCASO) FY68	36,000.00
**TOTAL OSS	$ 5,331,700.00

---

*Reimbursable.

**Does not include SRT Funds for 180 Program.

TABLE LVI - ALLOTMENTS Continued

PROCUREMENT FUNDS (REIMBURSABLE)

AIR FORCE FUNDS (490-934)

Phases I, II, III	$17,995,722.00
Non-Scout	9,151,773.65
TOTAL	$27,147,495.65

Date	MIPR No.	Type	Amount
12-14-65	65-42-1	66	$ 200,000.00
4-18-66	62-6-21	66	275,228.00
4-18-66	63-29-10	66	43,800.00*
6-30-66	62-6-22	66	368,200.00
6-30-66	63-29-11	66	1,042,580.58*
6-30-66	63-44-6	66	61,400.00
6-30-66	64-30-4	66	34,680.00
6-3-69	63-44-8	66	-40.00
Subtotal FY 1966			$ 2,025,848.58
1-4-67	66-95-3	67	$ -210,372.00**
4-27-66	66-95-3	67	1,375,372.00*
8-16-66	66-95	67	4,000,000.00*
10-14-66	66-95-1	67	2,056,000.00*
11-28-66	66-87	67	248,000.00
1-16-67	62-6-24	67	483,000.00
1-16-67	66-95-2	67	4,000,000.00*
4-17-67	62-6-25	67	33,000.00
5-22-67	62-6-26	67	6,000.00
Subtotal FY 1967			$11,991,000.00
11-27-67	63-44-7	68	$ 3,150.00
11-27-67	66-95-4	68	6,710,405.36*
4-27-68	66-95-4	68	-164,200.00**
6-10-68	66-95-5	68	168,825.33*
7-8-68	68-71	68	3,930,000.00*
7-8-74	66-95-15	68	-3,185,106.00
Subtotal FY 1968			$ 7,463,074.69
7-8-69	62-6-27	69	$ 267,502.30
7-8-69	63-29-12	69	217,031.41*
Subtotal FY 1969			$ 484,533.71
6-9-70	66-95-6	70	$ 520,931.00*
6-9-70	66-95-7	70	500,000.00*
Subtotal FY 1970			$ 1,020,931.00
12-29-70	66-95-8	71	$ 737,355.28*
7-7-71	66-95-9	71	3,726,000.00*
7-8-74	66-95-15	71	-2,850,000.00
Subtotal FY 1971			$ 1,613,355.28
TOTAL AIR FORCE FUNDS (490-934)			$51,746,238.91

AIR FORCE DEVELOPMENT FUNDS (890-934)#

NAVY FUNDS (490-924)			$ 9,703,348.00
##8-9-71	71-F-0921	71	2,600.00
TOTAL NAVY FUNDS			$ 9,705,948.00
TOTAL (490) DOD FUNDS			$61,452,186.91
AEC FUNDS (490-954) TOTAL			$ 2,397,563.60
TOTAL REIMBURSABLES			$63,849,750.51

SYS. ENG. AND MAINT. FUNDS (497-90-004)

PHASES I, II, III		$10,894,526.42

Date	Type	Amount
7-1-65	66	$ 1,500,000.00
11-22-65	66	1,000,000.00
2-15-66	66	1,500,000.00
8-4-70	66	-46.00
Subtotal FY 1966		$ 3,999,954.00
Suballotment-Wallops		-59,954.00
Suballotment-WSO		-24,799.99
LRC Allotment		$ 3,915,200.01
7-7-66	67	$ 250,000.00
8-29-66	67	3,750,000.00
4-24-70	67	-14,696.00
8-4-70	67	-6.00
3-21-72	67	-207.00
Subtotal FY 1967		$ 3,985,091.00
Suballotment-WSO		-46,694.79
Suballotment-Wallops		-19,994.00
LRC Allotment		$ 3,918,402.21
7-6-67	68	$ 1,000,000.00
8-2-67	68	1,000,000.00
9-22-67	68	25,000.00
10-2-67	68	475,000.00
11-16-67	68	1,875,000.00
5-14-68	68	589,000.00
3-21-72	68	-10.00
8-10-72	68	-1,328.00
Subtotal FY 1968		$ 4,962,662.00
Suballotment-Wallops		-71,120.35
Suballotment-KSC		-37,431.84
LRC Allotment		$ 4,854,109.81
7-1-68	69	$ 2,000,000.00
11-6-68	69	-2,000,000.00
Subtotal FY 1969		$ 0
TOTAL (497) SYS. ENG. AND MAINT.		$23,842,233.42

ESRO IB TRUST FUND (490-984)

Date	Type	Amount
1-6-70	70	$ 1,861,910.00
Subtotal FY 1970		$ 1,861,910.00
Suballotment-GSFC		-6,287.30
Suballotment-KSC		-17,812.59
LRC Allotment		$ 1,837,810.11
6-18-71	71	$ 350,000.00
Subtotal FY 1971		$ 350,000.00
TOTAL ESRO IB TRUST FUND (490-984)		$ 2,211,910.00

*Navy funds supplied by Air Force.
**Returned to A.F. as NASA support at VAFB.
#Data in Phases I, II, and III.
##For SOLRAD-C Payload Protective Shield, 60.900.127 (NAS1-7256-Ca33-S).

TABLE LVI Concluded - ALLOTMENTS

SUBAUTHORIZATIONS ISSUED

SCOUT FUNDS

497-004

FY 1965 and Prior	$144,527.78
FY66 - Wallops	59,954.00
FY66 - WTR	24,799.99
FY67 - WTR	46,694.79
FY67 - Wallops	19,993.14
FY67 - Wallops	71,120.35
FY68 - WTR	37,431.84
TOTAL 497	$404,521.89

490-004

FY69 - WTR	$ 24,788.00
FY70 - WTR	50,000.00
FY70 - Wallops	85,000.00
FY71 - Wallops	75,000.00
FY71 - WTR	50,000.00
TOTAL 490	$284,788.00

TOTAL SUBAUTHORIZATIONS $689,309.89

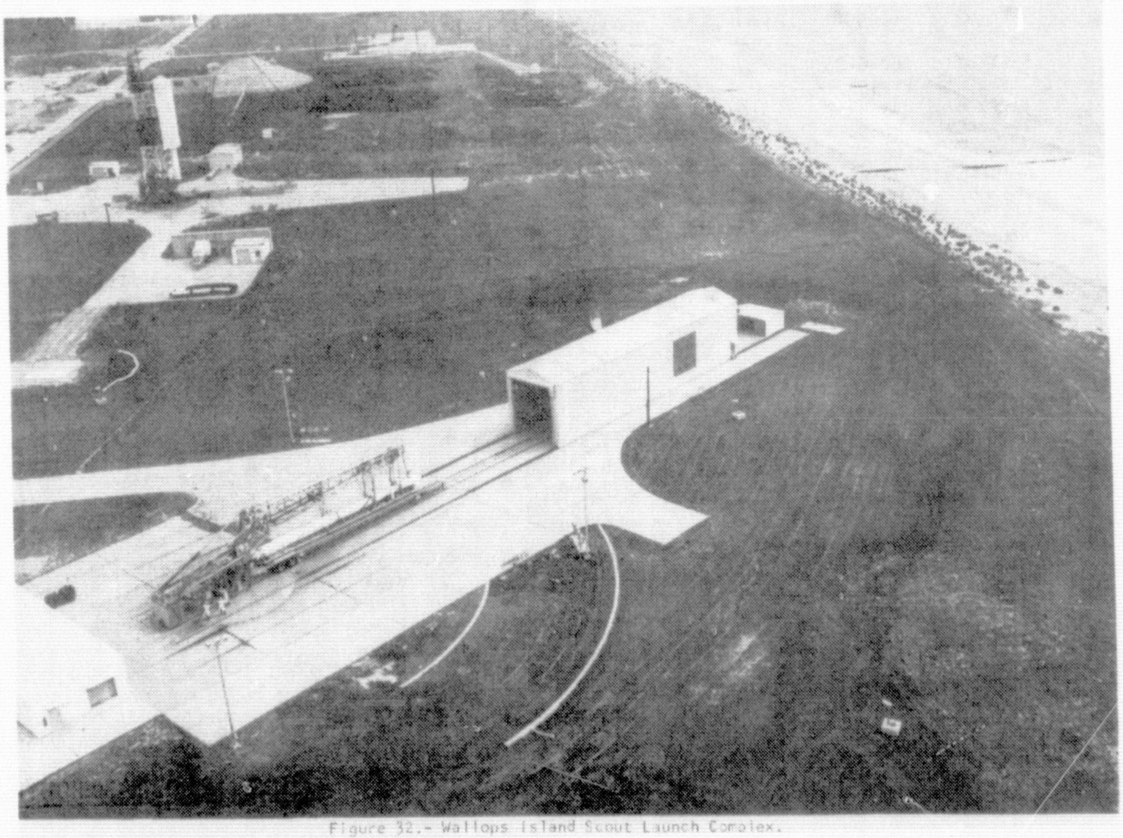


Figure 32.- Wallops Island Scout Launch Complex.

TABLE LIV - SCOUT SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

	PHASE III	PHASE IV				PHASE V					
	FY 1964-1965	FY 1964	FY 1966	FY 1967	FY 1968	FY 1965	FY 1966	FY 1967	FY 1968	PLANNED	TOTAL
-01 HARDWARE	$ 125,663.00	$700.00	$ 18,858.00	$ 313,278.09	$1,166,621.48	$1,227,063.81		$ 31,586.40			$ 2,883,770.78
Vehicles	(1,736.00)	(700.00)	(0)	(290,926.17)	(981,759.91)	(1,227,063.81)		(31,586.40)			
Spares	(-1,736.00)	(0)	(0)	(0)	(22,925.00						
Mission Mods (01-04)	(125,663.00)	(0)	(18,858.00)	(22,351.92)	(161,936.57)						
-02 SUPPORTING ACTIVITIES	7,841,925.61		3,747,431.93	1,305,801.50	1,021,517.86	1,625,614.00	$169,691.95	708,974.93	$2,815,151.93		19,236,109.71
DCASO	(38,442.00)		(134,408.56)	(67,509.61)	(45,627.20)*						
FIELD SERVICES											
Langley Research Center	(15,288.31)		(469.77)	(2,106.42)	(3,771.36)						
Wallops Station	(297,917.00)		(418,041.89)	(24,176.22)	(20,386.51)						
Suballotment-WI	(124,520.00)		(59,954.00)	(19,993.14)	(71,120.35)						
Western Test Range	(879,405.73)		(52,721.61)	(7,373.39)	(20,970.03)						
Suballotment-WTR	(0)		(24,799.99)	(46,694.79)	(37,431.84)						
PRODUCTION SUPPORT	(6,466,344.73)		(3,057,019.43)	(1,136,616.68)	(795,106.68)	(1,625,614.00)	(169,691.95)	(708,974.93)	(2,815,151.93)		
Suballotment-GSFC	(20,007.78)		(0)	(0)	(0)	(0)	(0)				
SHIPPING (02)			(16.68)	(1,331.25)	(27,103.75)						
-03 PRODUCT IMPROVEMENT	73,560.00		39,972.12	200,000.00	-107,360.47			1,425,449.22		$126,730.55	1,758,351.42
ALGOL NOZZLE	(73,560.00)		(39,972.12)		(256,097.53)			(7,968.25)			
FAILURE INVESTIGATION	(0)		(0)	(200,000.00)	(-363,458.00)			(51,000.00)			
FIFTH STAGE	(0)		(0)	(0)	(0)			(1,366,474.95)		(126,501.34	
SHIPPING								(6.02)		(229.21)	
TOTALS	$8,041,148.61	$700.00	$3,806,262.05	$1,819,079.59	$2,080,778.87	$2,852,677.81	$169,691.95	$2,166,010.55	$2,815,151.93	$126,730.55	$23,878,231.91

---

*Includes 36K OSS Direct.

TABLE LV - SCOUT LAUNCH RECORD FOR NASA MISSIONS

NASA NO.	DATE	PAYLOAD	VEH.NO.	CONFIG-URATION	PAYLOAD WEIGHT-LB	MISSION	RESULT(N.M.)	LAUNCH SITE	PAYLOAD DECAYED
1	7-1-60	LRC-Test	ST1	X-1		Probe		Wallops	7-1-60
2	10-4-60	AFWSC	ST2	X-1		Probe	3100	Wallops	10-4-60
3	12-4-60	S-56	ST3	X-1		O-Failed		Wallops	12-4-60
4	2-16-61	S-56A	ST4	X-1		Orbit-EXP-IX	1400-364	Wallops	4-9-64
5	6-30-61	S-55	ST5	X-1	187	O-Failed		Wallops	6-30-61
6	8-25-61	S-55A	ST6	X-1		O-Failed-EXP-XIII	261-62	Wallops	8-28-61
7	10-19-61	P21	ST7	X-1		Probe	3700	Wallops	10-19-61
8	3-1-62	RE-A(R-1)	ST8	X-1A		Reentry		Wallops	3-1-62
9	3-29-62	P21A	ST9	X-2		Probe	3292	Wallops	3-29-62
10	8-31-62	Re-B (R-2)	114	X-3A	314	R-Failed		Wallops	8-31-62
11	12-16-62	S-55B	115	X-3	155	Orbit-EXP-XVI	639-412	Wallops	12-16-62
12	7-20-63	Re-C (R-3)	110	X-3A	310	R-Failed		Wallops	7-20-63
13	12-19-63	ADIE-A (S-56B)	122R	X-4	218	Orbit-EXP-XIX	1295-326	WTR	
14	3-27-64	UK-C	127R	X-3	160	Orbit-Ariel II	732-160	Wallops	11-18-67
15	7-20-64	SERT	124R	X-4	387	Probe		Wallops	7-20-64
16	8-18-64	Re-D (R-4)	129R	X-4A	371	Reentry	27,841 ft/sec	Wallops	8-18-64
17	8-25-64	S-48	134R	X-4	113	Orbit-EXP-XX	555-474	WTR	
18	10-9-64	Beacon Exp. (S-66)	123RR	X-4	118	Orbit-EXP-XXII	591-487	WTR	
19	11-6-64	S-55C	133R	X-4	200	Orbit-EXP-XXIII	533-254	Wallops	
20	11-21-64	ADIE-B (S-56C)	135R	X-4	134	Orbit-EXP-XXIV & XXV	1351-289	WTR	(½)10-18-68
21	12-15-64	San Marco-A	137R	X-4	254	Orbit	448-116	Wallops	9-13-65
22	4-29-65	Beacon Exp. (S-66B)	136R	X-4	122	Orbit-EXP-XXVII	715-509	Wallops	
23	8-10-65	SEV-SECOR-5	131R	B	44	Orbit-Army	1314-618	Wallops	
24	11-18-65	SOLAR-A	138R	X-4	125	Orbit-EXP-XXX	481-387	Wallops	
25	12-6-65	French-A	139R	X-4	139	Orbit	422-401	WTR	
26	2-9-66	Re-E (R-4B)	141C	X-4A	394	Reentry	26,854 ft/sec	Wallops	2-9-66
27	4-26-67	San Marco-B	153C	B	281	Orbit	405-118	Africa	10-14-67
28	5-5-67	UK-E	155C	A	198	Orbit-Ariel III	329-272	WTR	
29	5-29-67	ESRO IIA	152C	B	163	O-Failed		WTR	5-29-67
30	10-19-67	RAM-C-A	159C	B	269	Reentry	25,008 ft/sec	Wallops	
31	3-5-68	SOLRAD	160C	B	197	Orbit-XXXVII	474-282	Wallops	
32	4-27-68	Re-F	164C	X-5C	600	Reentry	19,572 ft/sec	Wallops	4-27-68
33	5-16-68	ESRO IIB	161C	B	164	Orbit-EXP-XXXVIII	590-182	WTR	
34	8-8-68	ADIE-C	165C	B	190	Orbit-EXP-XXXIX & XL	1370-370	WTR	
35	8-22-68	RAM-C-B	168C	B	269	Reentry	24,986 ft/sec	Wallops	8-22-68
36	10-3-68	ESRO-IA	167C	B	187	Orbit-EXP-XLI	832-143	WTR	
37	10-1-69	ESRO-IB	172C	B	189	Orbit-Borealis	212-165	WTR	11-23-69
38	11-7-69	GRS-A	169C	B	158	Orbit-AZUR-1	1704-213	WTR	
39	9-30-70	RAM-C-C	171C	B	338	Reentry	24,032 fps	Wallops	9-30-70
40	11-9-70	OFO/RMS	174C	B	362	Orbit-EXP	(289-166)	Wallops	OFO-11/15/70:RMS-2-7-71
41	12-12-70	SAS-A	175C	B	317	Orbit-EXP-XLII	(309-287)	Africa	
42	4-24-71	San Marco-C	173C	B	361	Orbit	390-120	Africa	
43	6-20-71	PAET	144CR	B	287	Reentry	21,050 ft/sec	Wallops	6-20-71
44	7-8-71	SOLRAD-10(C)(NRL)	177C	B	263	Orbit-EXP-XLIV	(345-239)	Wallops	
45	8-16-71	CAS-A	180C	B	180	Orbit-EOLE	16,997	Wallops	
46	9-20-71	GRP-A	166C	B	70	Probe		Wallops	9-20-71
47	11-15-71	SSS-A	163C	B	114.9	Orbit-EXP-XLV	(14,532-119)	Africa	
48	12-11-71	UK-4	183C	B	263.4	Orbit	(324-262)	WTR	
49	8-13-72	MTS-A	184C	D	370.5	Orbit-EXP-XLVI	(272-444)	Wallops	
50	11-16-72	SAS-B	170C	D	410.1	Orbit	(632-444)	Africa	

SECTION III - SCOUT COSTS

TABLE LVII - TOTAL SCOUT PROGRAM
(Funding Thousands Dollars)

FISCAL YEAR	PHASES I, II, III	1966	1967	1968	1969	1970	1971	TOTAL
Vehicles (Funded)	52	6	11	10	2	4	3	87
Vehicles (Launched)	36	10	9	7	3	2	6	73
SCOUT DEVELOPMENT (890)								
LaRC	$19,103							
LaRC-SA	296							
MSC/LaRC	3,810							
HQ	2,242							
PLOO	185							
TOTAL (890)	$25,636	0	0	0	0	0	0	$ 25,636
SCOUT SEAM (497-90)								
LaRC	$10,750	$ 3,915	$ 3,918	$ 4,855				
LaRC-SA	145	85	67	108				
HQ	0	0	0	36				
TOTAL (497-90)	$10,895	$ 4,000	$ 3,985	$ 4,999	0	0	0	$ 23,879
SCOUT PROCUREMENT (490)								
LaRC	$29,591	$ 7,600	$ 5,400	$ 5,163	$12,491	$13,035	$12,541	
LaRC-SA	34	0	0	0	0	0	0	
HQ	0	100	0	74	109	118	112	
HQ-SM	0	0	0	0	0	547	547	
PLOO/KSC	99	0	0	0	0	0	0	
TOTAL (490)	$29,724	$ 7,700	$ 5,400	$ 5,237	$12,600	$13,700	$13,200	$ 87,561
AMES (711)	0	0	0	0	$ 200	0	0	$ 200
SCOUT C of F (5315)	$ 1,433	0	0	0	0	0	0	$ 1,433
TOTAL NASA SCOUT PROGRAM**	$67,688	$11,700	$ 9,385	$10,236	$12,800	$13,700	$13,200	$138,709
SCOUT REIMBURSABLE (890)	$ 500							
SCOUT REIMBURSABLE (490)								
NAVY	$ 9,703	$ 0	$ 0	$ 0	$ 0	$ 0	$ 3	
NAVY via A.F.	6,160	1,086	11,221	10,645	217	1,154	4,463	
*A.F.	20,988	843	770	3	268	0	0	
AEC	2,398	0	0	0	0	0	0	
TOTAL REIMBURSABLES	$39,749	$ 1,929	$11,991	$10,648	$ 485	$ 1,154	$ 4,466	
(LESS) A.F. NON-SCOUT	$ 9,152	$ 98	$ 248	$ 3	$ 0	$ 0	$ 0	
(LESS) NASA-VAFB SHARE	0	0	210	164	158	134	0	
TOTAL SCOUT REIMBURSABLE	$30,597	$ 1,833	$11,533	$10,481	$ 327	$ 1,020	$ 4,466	$ 60,257
INTERNATIONAL TRUST FUNDS								
ESRO IB	0	0	0	0	0	$ 1,862	$ 350	
SAN MARCO	680	0	30	0	48	250	0	
TOTAL INTERNATIONAL TRUST FUNDS	$ 680	$ 0	$ 30	$ 0	$ 48	$ 2,112	$ 350	$ 3,220
TOTAL SCOUT	$98,965	$13,533	$20,948	$20,717	$13,175	$16,832	$18,016	$202,186

---

*Includes Non-Scout Air Force Programs (Note Deducted Below).

**Does not include mission requirements - Funded by Subauthorization to LaRC.

TABLE LVIII - SCOUT NASA PRODUCTION EXPENDITURES

	FY 1965 & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	FY 1972	FY 1973	TOTAL
PHASES II AND III										
Vehicles (01-01)	$10,009,754.90	$ 138,107.51	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$10,147,862.41
Motors (01-02) (Total)	3,917,471.61	10,783.00	0	0	0	0	0	0	0	3,928,254.61
First Stage	2,277,523.71	0								
Second Stage	476,710.07	0								
Third Stage	453,318.74	0								
Fourth Stage	709,919.09	19,783.00								
Spares (01-03)	704,601.04	23,098.00	0	0	0	0	0	0	0	727,699.04
Mission Mods (01-04)	225,716.39	0	0	0	0	0	0	0	0	225,716.39
*Supporting Activities (02)	3,132,798.88	-6,653.00	0	0	0	0	0	0	0	3,126,145.88
Product Improvement (03)	457,323.00	0	0	0	0	0	0	0	0	457,323.00
DIRECT OSS	98,700.00	0	0	0	0	0	0	0	0	98,700.00
PHASE IV										
Vehicles (01-01)	0	1,812,695.99	23,819.96	482,525.30	12,696.06	213,305.25	142,915.00	0	56,906.00	2,744,863.56
Motors (01-02) (Total)	0	1,964,678.81	674,314.31	64,709.45	0	3,709.00	0	0	0	2,707,411.57
First Stage		499,279.51	154,842.00	14,357.20		0				
Second Stage		103,810.00	546,932.00	720.95		0				
Third Stage		487,267.82	-29,383.00	42,896.20		3,709.00				
Fourth Stage		874,321.48	1,923.31	6,735.10		0				
Spares (01-03)	0	266,507.77	111,527.00	56,667.92	0	0	26,787.00	0	0	461,489.69
Mission Mods (01-04)	0	114,600.62	1,080.00	2.75	35,840.00	155,447.25	0	0	384.00	30[illegible],354.[illegible]
*Supporting Activities (02)	0	1,599,476.55	555,556.59	756,555.05	4,992.80	18,352.62	444,442.00	211,601.00	1,325.00	3,592,301.61
Product Improvement (03)	0	31,295.05	117.82	113,587.13	246,529.35	0	3,254.00	0	0	394,783.35
DIRECT OSS	0	100,000.00	0	0	0	0	0	0	0	100,000.00
PHASE V										
Vehicles (01-01)	0	881,235.31	1,552,718.27	493,986.51	1,507,737.91	2,842,145.22	219,819.65	0	0	7,297,642.87
Motors (01-02) (Total)	0	705,131.50	2,123,868.93	83,851.00	76,717.10	738,880.67	56,136.65	0	0	3,784,586.05
First Stage		9,782.00	726,920.00	6,387.83	5,321.94	644,124.21	28,351.00			
Second Stage		97,740.00	706,107.25	19,007.07	36,104.00	16,267.39	4,800.64			
Third Stage		334,530.50	535,356.00	7,724.29	5,881.30	7,290.65	9,003.14			
Fourth Stage		263,079.00	155,485.68	50,731.81	29,409.86	71,198.62	13,981.87			
Spares (01-03)	0	0	9,530.00	75,897.00	448,172.25	169.05	57,987.00	0	0	591,755.30
Mission Mods (01-04)	0	47,989.00	159,000.00	73,851.32	83,502.65	153,628.00	356,072.17	59,319.75	0	933,362.89
*Supporting Activities (02)	0	-15,209.11	732.00	1,283,169.51	1,150,893.16	4,690,496.20	3,583,698.30	1,747,424.31	57,056.00	12,498,260.37
Product Improvement (03)	0	0	0	0	0	0	0	0	0	0
DIRECT OSS	0	0	0	37,000.00	109,000.00	665,000.00	659,000.00	0	0	1,470,000.00
TOTAL NASA SCOUT PRODUCTION	$18,546,365.82	$7,682,737.00	$5,212,264.88	$3,521,802.94	$3,476,081.28	$9,481,133.46	$5,550,111.77	$2,018,345.06	$115,671.00	$55,604,513.21

---

*Includes DCASO.

TABLE LIX - SCOUT PROGRAM R & D OBLIGATIONS
Fiscal Year Obligated

FISCAL YEAR FUNDS	FY 1965 & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	TOTAL
DEVELOPMENT (890)								
FY 1959 (STG)	$3,810,488.00							$ 3,810,488.00
FY 1959	3,366,000.00							3,366,000.00
FY 1960	3,000,000.00			$ -21,956.96				2,978,043.04
FY 1961	6,600,000.00							6,600,000.00
FY 1962	2,941,062.39					$ -29,844.97		2,911,217.42
FY 1963	3,491,580.22	$ 320.00		-200.00				3,491,700.22
FY 1961 (OSS)	300,000.00							300,000.00
FY 1962 (OSS)	1,725,000.00							1,725,000.00
FY 1963 (OSS)	402,000.00							402,000.00
SUBTOTAL	$25,636,130.61	$ 320.00	$ 0	$ -22,156.96	$ 0	$ -29,844.97	$ 0	$ 25,584,448.68
PRODUCTION (490)								
FY 1961	1,200,000.00							1,200,000.00
FY 1962	6,582,984.92							6,582,984.92
FY 1963	8,054,000.00							8,054,000.00
FY 1964	7,977,770.00	122,230.00						8,100,000.00
FY 1965	5,585,065.35	103,234.65						5,688,300.00
FY 1966		6,288,313.63	1,311,686.37					7,600,000.00
FY 1967			5,330,817.52	69,182.48		-398.00		5,399,602.00
FY 1968				5,155,030.62	7,969.38			5,163,000.00
FY 1969					12,477,836.37	7,563.63	5,600.00	12,491,000.00
#FY 1970						13,033,988.03	1,011.97	13,035,000.00
FY 1971							12,517,201.54	12,517,201.54
FY 1965-71 (OSS)	98,700.00	100,000.00		37,000.00	109,000.00	665,000.00	659,000.00	1,668,700.00
SUBTOTAL	$29,498,520.27	$6,613,778.28	$6,642,503.89	$5,261,213.10	$12,594,805.74	$13,706,153.66	$13,182,813.51	$ 87,[illegible].788.46
SEAM (497)								
FY 1964	3,375,500.00	24,500.00						3,400,000.00
FY 1965	4,500,895.14	2,999,104.86		-4,993.58		-480.00		7,494,526.42
FY 1966		3,288,229.36	711,770.64			-46.00		3,999,954.00
FY 1967			3,851,737.28	148,262.72		-14,903.86	0.86	3,985,091.00
FY 1968				4,955,024.48	8,715.06	260.46	-10.00	4,963,990.00
FY 1968 (OSS)				36,000.00				36,000.00
SUBTOTAL	$7,876,395.14	$6,311,834.22	$4,563,507.92	$5,134,293.62	$ 8,715.06	$ -15,175.40	$ -9.14	$ 23,879,561.42
ESRO 1B								
FY 1970						1,861,910.00		1,861,910.00
FY 1971							347,571.87	347,571.87
SUBTOTAL	$ 0	$ 0	$ 0	$ 0	$ 0	$1,861,910.00	$ 347,571.87	$ 2,209,481.87
CONSTRUCTION OF FACILITIES (NASA)								
FY 1960 (OSS)	1,200,000.00							1,200,000.00
FY 1962	1,433,131.43							1,433,131.43
SUBTOTAL	$2,633,131.43	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 2,633,131.43
**NASA TOTAL	$65,644,177.45	$12,925,932.50	$11,206,011.81	$10,373,349.76	$12,603,520.81	$15,523,043.29	$13.530.376.24	$141,812,411.86
AIR FORCE								
*FY 1960	$5,644,886.66			$ -41,824.88				$ 5,603,061.78
*FY 1961	1,115,874.28							1,115,874.28
FY 1926	10,251,940.76	-46,634.94	76,801.55	-8,250.42				10,273,856.95
FY 1963	6,174,441.43	437,136.80	298,296.63	22,126.34	-13,932.17	-4,615.83	18,548.00	6,932,001.20
FY 1964	979,381.00	-29,659.54	29,659.54	-2,000.00				977,381.00
FY 1965	950,047.10	398,911.83	1,377,187.08	19,174.43	-7,506.46	7,506.46		2,745,320.44
FY 1966		293,013.90	1,695,399.36	37,454.74	-1,408.42	1,389.00		2,025,848.58
FY 1967			11,508,869.22	-7,999.62	-1,097,322.62	-1,089,420.67	-304,172.48	9,009,953.83
FY 1968				1,748,389.00	107,000.00	63,244.81	209,619.03	2,128,252.84
FY 1967-8-0 (VAFB)			210,372.00	164,200.00	158,350.00	134,250.00		667,172.00
FY 1969						484,533.71		484,533.71
FY 1971							4,345.24	4,345.24
SUBTOTAL	$25,116,571.23	$ 1,052,768.05	$15,196,585.38	$ 1,931,269.59	$ -854,819.67	$ -403,112.52	$ -71,660.21	$ 41,967,601.85
NAVY								
FY 1961	1,800,000.00							1,800,000.00
FY 1962	7,889,502.23	-6,328.58	16,816.94	9.41				7,900,000.00
FY 1965		3,348.00						3,348.00
SUBTOTAL	$9,689,502.23	$ -2,980.58	$ 16,816.94	$ 9.41	$ 0	$ 0	$ 0	$ 9,703,348.00
AEC								
FY 1963 (AL)	26,563.60							26,563.60
FY 1963	2,877,597.59	-506,597.59		1,000.00	-1,000.00			2,371,000.00
FY 1964	600,000.00	-600,000.00						0
SUBTOTAL	$3,504,161.19	$-1,106,597.59	$ 0	$ 1,000.00	$ -1,000.00	$ 0	$ 0	$ 2,397,563.60
REIMBURSABLE TOTALS	$38,310,234.65	$ -56,810.12	$15,213,402.32	$ 1,932,279.00	$ -855,819.67	$ -403,112.52	$ -71,660.21	$ 54,068,513.45
TOTAL	$103,954,412.10	$12,869,122.38	$26,419,414.13	$12,305,628.76	$11,747,701.14	$15,119,930.77	$13,458,716.03	$195,874,925.31

#Includes San Marco.
*609A Program.
**Does not include suballotments received nor SRT funds.

TABLE LX - 490-CONTRACTUAL REQUIREMENTS
(Millions Dollars)

											TRUST FUND		R	
	FY62	FY63	FY64	FY65	FY66	FY67	FY68	FY69	FY70	FY71	SRT	SM	ESRO-1B	DOD	TOTAL
NAS1-5610				2.995	1.295	3.824	0.334	0.055	1.861				0.820	1.119	12.303
NAS1-7199							1.521	7.606	1.129					2.176	12.432
NAS1-7256							2.196	2.774	5.100	0.176			0.964	1.508	12.718
NAS1-9258								0.300	1.000	2.973					4.273
NAS1-10000	0.009	0.089	0.107	0.041	0.020		0.008	0.046	0.968	7.724	0.192	0.236		4.219	13.659
NAS1-10500											0.118				0.118
NAS1-11000										0.005				3.297	3.302
NAS1-11400										0.077				2.806	2.883
OSS						0.199	0.073	0.109	0.665	0.659	0.274				1.979
S/A	0.011	0.285	0.060	0.085	0.085	0.066	0.108	0.025	0.135	0.125			0.024		1.009
ROS								0.243	0.202	0.423					0.868
*OTHERS	6.563	7.680	11.333	10.161	10.300	5.296	5.960	1.442	2.640	1.038	4.355	1.272	0.404	56.011	124.455
TOTAL	6.583	8.054	11.500	13.282	11.700	9.385	10.200	12.600	13.700	13.200	4.939	1.508	2.212	71.136	189.999

---

*Includes set-a-sides, expired contracts not listed, purchase orders, shipping in-house, reserves for incentives, DOD travel, etc.

TABLE LXI - SCOUT COSTS BY PHASES
(Thousands Dollars)

R & D FUNDS

	G.S.E.	Special Support	(9 Veh.) Phase I	(10 Veh.) Phase II	(14 Veh.) Phase III	(25 Veh.) Phase IV*	(15 Veh.) Phase V	(103 Veh.) Plus GSE TOTAL
NASA 894	$ 0	$3,233	$ 0	$ 0	$ 0	$ 0	$ 0	$ 3,233
NASA 890	5,612	6,026	13,360	978	0	0	0	25,976
NASA (OSS)890	177	0	2,250	0	0	0	0	2,427
NASA 490-01	0	4,000	0	3,627	15,630	12,321	16,353	51,931
NASA (OSS)490	99	904	0	0	0	0	2,067	3,070
NASA 497, 490-02, 03	5,250	6,181	0	0	27,603	8,711	17,639	65,384
NASA (C/F)	1,433	0	0	0	0	0	0	1,433
NASA (OSS)C/F	1,200	0	0	0	0	0	0	1,200
NASA-SRT-180	0	4,806	0	0	0	0	0	4,806
NAVY (62-7087/98)	1,491	0	0	5,524	1,587	1,098	0	9,700
NAVY (AF/63-29)	158	0	0	686	2,271	4,063**	282	7,460
AIR FORCE (62-6)	781	38	0	1,165	1,484	7,625	0	11,093
AIR FORCE (62-32)	0	556	0	1,389	0	0	0	1,945
AIR FORCE (63-20)890	0	0	0	0	500	0	0	500
AIR FORCE (65-42)	400	0	0	0	0	0	0	400
AIR FORCE (66-95)	509	0	0	-1	0	11,680	2,302	14,490
AIR FORCE (68-F-0071)	0	0	0	0	0	0	0	0
AEC (AT-49-5-2218)	0	28	0	90	2,309	0	0	2,427
INTER-S/M (894)	0	273	0	5	0	14	333	625
INTER-ESRO	0	0	0	0	0	0	2,502	2,502
NASA (711)	0	200	0	0	0	0	0	200
INTER-UK	0	0	0	0	0	0	0	0
TOTAL	$17,110	$26,245	$15,610	$13,463	$51,384	$45,512	$41,478	$210,802

---

*Phase III completed 8-10-66. Phase IV complete except for S-144 (does not include San Marco Program(*894).
**Includes DOD deductions for NASA share of Field Services.

TABLE LXII - SCOUT FY 1966 OBLIGATIONS

JULY 1, 1966

NASA	OBLIGATED THRU FY65	OBLIGATED FY66	TOTAL OBLIGATED
SEAM 497-90			
FY64	$ 3,375,500.00	$ 24,500.00	$ 3,400,000.00
FY65	4,500,895.14	2,999.104.86	7,500,000.00
FY66	0	3,288,229.36	3,288,229.36
Total 497-90	$ 7,876,395.14	$ 6,311,834.22	$14,188,229.36
Production 490			
FY61	$ 1,200,000.00	0	$ 1,200,000.00
FY62	6,549,094.53	0	6,549,094.53
FY63	8,054,000.00	0	8,054,000.00
FY64	7,977,770.00	122,230.00.	8,100,000.00
FY65	5,585,065.35	103,234.65	5,688,300.00
FY65 OSS	98,700.00	0	98,700.00
FY66	0	6,288,313.63	6,288,313.63
FY66 OSS	0	100,000.00	100,000.00
Total 490	$29,464,629.88	$ 6,613,778.28	$36,078,408.16
Total NASA	$37,341,025.02	$12,925,612.50	$50,266,637.52
REIMBURSABLES			
Air Force 62-6			
FY62	$ 7,233,055.76	$ (43,864.43)	$ 7,189,191.33
FY63	809,658.04	35,474.35	845,132.39
FY64	260,281.00	(29,659.54)	230,621.46
FY65	290,699.37	724,227.19	1,014,926.56
FY66	0	0	0
Air Force 63-32			
FY62	456,298.00	0	456,298.00
FY63	1,360,932.00	127,068.00	1,488,000.00
Air Force 65-42			
FY65	200,000.00	0	200,000.00
FY66	0	200,000.00	200,000.00
Navy (Air Force 63-29)			
FY62	975,670.00	0	975,670.00
FY63	3,418,132.19	(225,271,55)	3,192,860.64
FY64	464,000.00	0	464,000.00
FY65	435,447.73	690,509.20	1,125,956.93
FY66	0	0	0
Navy			
FY61	1,800,000.00	0	1,800,000.00
FY62	7,899,551.18	(16,377.53)	7,883,173.65
AEC			
FY63	2,904,161.19	(506,597.59)	2,397,563.60
FY64	600,000.00	(600,000.00)	0
Total Reimbursables	$29,107,886.46	$ 355,508.10	$29,463,394.56
TOTAL OBLIGATED	$66,448,911.48	$13,281,120.69	$79,730,032.08

TABLE LXIII - SCOUT FY 1967 OBLIGATIONS

JULY 1, 1967

NASA	OBLIGATED THRU FY66	OBLIGATED FY67	TOTAL OBLIGATED
SEAM 497-90			
FY64	$ 3,400,000.00	$ 0	$ 3,400,000.00
FY65	7,500,000.00	0	7,500,000.00
FY66	3,288,229.36	711,770.64	4,000,000.00
FY67	0	3,851,737.28	3,851,737.28
Total 497-90	$14,188,229.36	$ 4,563,507.92	$18,751,737.28
Production 490			
FY61	$ 1,200,000.00	$ 0	$ 1,200,000.00
FY62	6,549,094.53	0	6,549,094.53
FY63	8,054,000.00	0	8,054,000.00
FY64	8,100,000.00	0	8,100,000.00
FY65	5,688,300.00	0	5,688,300.00
FY65 OSS (PL00)	98,700.00	0	98,700.00
FY66	6,288,313.63	1,311,686.37	7,600,000.00
FY66 OSS	100,000.00	0	100,000.00
FY67	0	5,330,817.52	5,330,817.52
Total 490	$36,078,408.16	$ 6,642,503.89	$42,720,912.05
Total NASA	$50,266,637.52	$11,206,011.81	$61,472,649.33
REIMBURSABLES			
Air Force 62-6			
FY62	$ 7,189,191.33	$ 73,173.50	$ 7,262,364.83
FY63	845,132.39	48,012.03	893,144.42
FY64	230,621.46	29,659.54	260,281.00
FY65	1,014,926.56	260,579.44	1,275,506.00
FY66	0	640,952.68	640,952.68
FY67	0	495,291.55	495,291.55
Air Force 63-32			
FY62	456,298.00	0	456,298.00
FY63	1,488,000.00	0	1,488,000.00
Air Force 65-42			
FY65	200,000.00	0	200,000.00
FY66	200,000.00	0	200,000.00

TABLE LXIII Concluded - SCOUT FY 1967 OBLIGATIONS

JULY 1, 1967

	OBLIGATED THRU FY66	OBLIGATED FY67	TOTAL OBLIGATED
REIMBURSABLES Continued			
Navy (Air Force 63-29)			
FY62	$ 975,670.00	$ 0	$ 975,670.00
FY63	3,192,860.64	250,098.40	3,442,959.04
FY64	464,000.00	0	464,000.00
FY65	1,125,956.93	101,581.08	1,227,538.01
FY66	0	1,051,380.58	1,051,380.58
Navy (Air Force 66-95)			
FY67	0	10,765,577.67	10,765,577.67
FY67-Direct	0	210,372.00	210,372.00
Navy			
FY61	1,800,000.00	0	1,800,000.00
FY62	7,883,173.65	16,653.07	7,899,826.72
AEC			
FY63	2,397,563.60	0	2,397,563.60
FY64	0	0	0
Total Reimbursables	$29,463,394.56	$13,943,331.54	$43,406,726.10
TOTAL OBLIGATED	$79,730,032.08	$25,149,343.35	$104,879,375.43

TABLE LXIV - SCOUT FY 1968 OBLIGATIONS

July 1, 1968

NASA	OBLIGATED THRU FY67	OBLIGATED FY68	TOTAL OBLIGATED
SEAM 497-90			
FY64	$ 3,400,000.00	$ 0	$ 3,400,000.00
FY65	7,500,000.00	-4,993.58	7,495,006.42
FY66	4,000,000.00	0	4,000,000.00
FY67	3,851,737.28	148,262.72	4,000,000.00
FY68	0	4,955,024.48	4,955,024.48
FY68 OSS -DCASO	0	36,000.00	36,000.00
Total 497-90	$18,751,737.28	$5,134,293.62	$ 23,886,030.90
Production 490			
FY61	$ 1,200,000.00	$ 0	$ 1,200,000.00
FY62	6,582,984.92	0	6,582,984.92
FY63	8,054,000.00	0	8,054,000.00
FY64	8,100,000.00	0	8,100,000.00
FY65	5,688,300.00	0	5,688,300.00
FY65 OSS (PLOO)	98,700.00	0	98,700.00
FY66	7,600,000.00	0	7,600,000.00
FY66 OSS	100,000.00	0	100,000.00
FY67	5,330,817.52	69,182.48	5,400,000.00
FY68	0	5,155,030.62	5,155,030.62
FY68 OSSA-DCASO	0	37,000.00	37,000.00
Total 490	$42,754,802.44	$5,261,213.10	$ 48,016,015.54
Total NASA	$61,506,539.72	$10,395,506.72	$ 71,902,046.44
REIMBURSABLES			
Air Force 62-6			
FY62	$ 7,262,364.83	$ 17.17	$ 7,262,382.00
FY63	893,144.42	141.58	893,286.00
FY64	260,281.00	0	260,281.00
FY65	1,275,506.00	0	1,275,506.00
FY66	640,952.68	2,475.32	643,428.00
FY67	495,291.55	26,708.45	522,000.00
Air Force 63-32			
FY62	456,298.00	0	456,298.00
FY63	1,488,000.00	0	1,488,000.00
Air Force 65-42			
FY65	200,000.00	0	200,000.00
FY66	200,000.00	0	200,000.00

TABLE LXIV Concluded - SCOUT FY 1968 OBLIGATIONS

July 1, 1968

REIMBURSABLES Continued	OBLIGATED THRU FY67	OBLIGATED FY68	TOTAL OBLIGATED
Navy (Air Force 63-29)			
FY62	$ 975,670.00	$ 0	$ 975,670.00
FY63	3,442,959.04	22,040.96	3,465,000.00
FY64	464,000.00	0	464,000.00
FY65	1,227,538.01	27,760.99	1,255,299.00
FY66	1,051,380.58	35,019.42	1,086,400.00
Navy (Air Force 66-95)			
FY67	10,765,577.67	-34,708.07	10,730,869.60
FY68	0	1,745,239.00	1,745,239.00
FY67 Direct	210,372.00	0	210,372.00
FY68 Direct	0	164,200.00	164,200.00
Navy			
FY61	1,800,000.00	0	1,800,000.00
FY62	7,899,826.72	55.99	7,899,882.71
AEC			
FY63	2,397,563.60	1,000.00	2,398,563.60
Total Reimbursables	$ 43,406,726.10	$1,989,950.81	45,396,676.91
TOTAL OBLIGATED	$104,913,265.82	$12,385,457.53	$117,298,723.35

TABLE LXV - SCOUT FY 1969 OBLIGATIONS

July 1, 1969

NASA	OBLIGATED THRU FY68	OBLIGATED FY69	TOTAL OBLIGATED
SEAM 497-90			
FY64	$ 3,400,000.00	$ 0	$ 3,400,000.00
FY65	7,495,006.42	0	7,495,006.42
FY66	4,000,000.00	0	4,000,000.00
FY67	4,000,000.00	0	4,000,000.00
FY68	4,955,024.48	8,715.06	4,963,739.54
FY68 OSS -DCASO	36,000.00	0	36,000.00
Total 497-90	$23,886,030.90	$ 8,815.06	$23,894,745.96
PRODUCTION 490			
FY61	$ 1,200,000.00	$ 0	$ 1,200,000.00
FY62	6,582,984.92	0	6,582,984.92
FY63	8,054,000.00	0	8,054,000.00
FY64	8,100,000.00	0	8,100,000.00
FY65	5,688,300.00	0	5,688,300.00
FY65 OSS (PLOO)	98,700.00	0	98,700.00
FY66	7,600,000.00	0	7,600,000.00
FY66 OSS	100,000.00	0	100,000.00
FY67	5,400,000.00	0	5,400,000.00
FY68	5,155,030.62	7,969.38	5,163,000.00
FY68 OSS -DCASO	37,000.00	0	37,000.00
FY69	0	12,477,836.37	12,477,836.37
FY69 OSS -DCASO	0	109,000.00	109,000.00
Total 490	$48,016,015.54	$12,594,805.75	$60,610,821.29
Total NASA	$71,902,046.44	$12,603,520.81	$84,505,567.25
REIMBURSABLES			
Air Force 62-6			
FY62	$ 7,262,382.00	$ 0	$ 7,262,382.00
FY63	893,286.00	-356.92	892,929.08
FY64	260,281.00	0	260,281.00
FY65	1,275,506.00	-6,756.46	1,268,749.54
FY66	643,428.00	-1,389.00	642,039.00
FY67	522,000.00	0	522,000.00
Air Force 63-32			
FY62	456,298.00	0	456,298.00
FY63	1,488,000.00	0	1,488,000.00

TABLE LXV Concluded - SCOUT 1969 OBLIGATIONS

July 1, 1969

REIMBURSABLES Continued	OBLIGATED THRU FY68	OBLIGATED FY69	TOTAL OBLIGATED
Air Force 65-42			
FY65	$ 200,000.00	$ 0	$ 200,000.00
FY66	200,000.00	0	200,000.00
Navy (Air Force 63-29)			
FY62	$ 975,670.00	$ 0	$ 975,670.00
FY63	3,465,000.00	-13,575.25	3,451,424.75
FY64	464,000.00	0	464,000.00
FY65	1,255,299.00	-750.00	1,254,549.00
FY66	1,086,400.00	-19.42	1,086,380.58
FY69 Direct	0	158,350.00	158,350.00
Navy (Air Force 66-95)			
FY67	10,730,869.60	-1,097,322.62	9,633,546.98
FY68	1,745,239.00	107,000.00	1,852,239.00
FY67 Direct	210,372.00	0	210,372.00
FY68 Direct	164,200.00	0	164,200.00
Navy			
FY61	1,800,000.00	0	1,800,000.00
FY62	7,899,882.71	0	7,899,882.71
AEC			
FY63	2,398,563.60	-1,000.00	2,397,563.60
Total REIMBURSABLES	$45,396,676.91	$ -855,819.67	$44,540,857.24
TOTAL OBLIGATED	$117,298,723.35	$11,722,701.14	$129,021,424.49

TABLE LXVI - SCOUT FY 1970 OBLIGATIONS

July 1, 1970

NASA	OBLIGATED THRU FY69	OBLIGATED FY70	TOTAL OBLIGATED
SEAM 497-90			
FY64	$ 3,400,000.00	$ 0	$ 3,400,000.00
FY65	7,495,006.42	-480.00	7,494,526.42
FY66	4,000,000.00	-46.00	3,999,954.00
FY67	4,000,000.00	-14,909.86	3,985,090.14
FY68	4,963,739.54	260.46	4,964,000.00
FY68 OSS -DCASO	36,000.00	0	36,000.00
Total 497-90	$23,894,745.96	$ -15,175.40	$23,879,570.56
PRODUCTION 490			
FY61	$ 1,200,000.00	$ 0	$ 1,200,000.00
FY62	6,582,984.92	0	6,582,984.92
FY63	8,054,000.00	0	8,054,000.00
FY64	8,100,000.00	0	8,100,000.00
FY65	5,688,300.00	0	5,688,300.00
FY65 OSS (PLOO)	98,700.00	0	98,700.00
FY66	7,600,000.00	0	7,600,000.00
FY66 OSS	100,000.00	0	100,000.00
FY67	5,400,000.00	-398.00	5,399,602.00
FY68	5,163,000.00	0	5,163,000.00
FY68 OSS -DCASO	37,000.00	0	37,000.00
FY69	12,477,836.37	7,563.63	12,485,400.00
FY69 OSS -DCASO	109,000.00	0	109,000.00
FY70	0	13,033,988.03	13,033,988.03
FY70 OSS -DCASO	0	118,000.00	118,000.00
Total 490	$60,610,821.29	$13,159,153.66	$73,769,974.95
Total NASA	$84,505,567.25	$13,143,978.26	$97,649,545.51
REIMBURSABLES			
Air Force 62-6			
FY62	$ 7,262,382.00	$ 0	$ 7,262,382.00
FY63	892,929.08	356.92	893,286.00
FY64	260,281.00	0	260,281.00
FY65	1,268,749.54	6,756.46	1,275,506.00
FY66	642,039.00	1,389.00	643,428.00
FY67	522,000.00	-1,388.00	520,612.00
FY69	0	267,502.30	267,502.30
Air Force 63-32			
FY62	456,298.00	0	456,298.00
FY63	1,488,000.00	0	1,488,000.00

TABLE LXVI Concluded-SCOUT FY 1970 OBLIGATIONS

July 1, 1970

REIMBURSABLES Continued	OBLIGATED THRU FY69	OBLIGATED FY70	TOTAL OBLIGATED
Air Force 65-42			
FY65	$ 200,000.00	$ 0	$ 200,000.00
FY66	200,000.00	0	200,000.00
Navy (Air Force 63-29)			
FY62	$ 975,670.00	0	975,670.00
FY63	3,451,424.75	-4,972.75	3,446,452.00
FY64	464,000.00	0	464,000.00
FY65	1,254,549.00	750.00	1,255,299.00
FY66	1,086,380.58	0	1,086,380.58
FY69	0	217,031.41	217,031.41
FY69 Direct	158,350.00	0	158,350.00
Navy (Air Force 66-95)			
FY67	9,633,546.98	-1,088,032.67	8,545,514.31
FY68	1,852,239.00	100,000.00	1,952,239.00
FY67 Direct	210,372.00	0	210,372.00
FY68 Direct	164,200.00	0	164,200.00
FY70 Direct	0	134,250.00	134,250.00
Navy			
FY61	1,800,000.00	0	1,800,000.00
FY62	7,899,882.71	116.41	7,899,999.12
AEC			
FY63	2,397,563.60	0	2,397,563.60
Total REIMBURSABLES	$44,540,857.24	$ -366,240.92	$44,174,616.32
TOTAL OBLIGATED	$129,046,424.49	$12,777,737.34	$141,824,161.83

TABLE LXVII - SCOUT FY 1971 OBLIGATIONS

July 1, 1971

NASA	OBLIGATED THRU FY70	OBLIGATED FY71	TOTAL OBLIGATED
SEAM 497-90			
FY64	3,400,000.00	$ 0	$ 3,400,000.00
FY65	7,494,526.42	0	7,494,526.42
FY66	3,999,954.00	0	3,999,954.00
FY67	3,985,090.14	0.86	3,985,091.00
FY68	4,964,000.00	-10.00	4,963,990.00
FY68 OSSA-DCASO	36,000.00	0	36,000.00
Total 497-90	$ 23,879,570.56	$ -9.14	$ 23,879,561.42
PRODUCTION 490			
FY61	$ 1,200,000.00	$ 0	$ 1,200,000.00
FY62	6,582,984.92	0	6,582,984.92
FY63	8,054,000.00	0	8,054,000.00
FY64	8,100,000.00	0	8,100,000.00
FY65	5,688,300.00	0	5,688,300.00
FY65 OSS (PLOO)	98,700.00	0	98,700.00
FY66	7,600,000.00	0	7,600,000.00
FY66 OSS.	100,000.00	0	100,000.00
FY67	5,399,602.00	0	5,399,602.00
FY68	5,163,000.00	0	5,163,000.00
FY68 OSS -DCASO	37,000.00	0	37,000.00
FY69	12,485,400.00	5,600.00	12,491,000.00
FY69 OSS -DCASO	109,000.00	0	109,000.00
FY70	13,033,988.03	1,011.97	13,035,000.00
FY70 OSS -DCASO-SM	118,000.00	547,000.00	665,000.00
FY71	0	12,517,201.54	12,517,201.54
FY71 OSS -DCASO-SM	0	659,000.00	659,000.00
Total 490	$ 73,769,974.95	$13,729,813.51	$ 87,499,788.46
Total NASA	$ 97,649,545.51	$13,729,804.37	$111,379,349.88
REIMBURSABLES			
Air Force 62-6			
FY62	$ 7,262,382.00	$ 0	$ 7,262,382.00
FY63	893,286.00	0	893,286.00
FY64	260,281.00	0	260,281.00
FY65	1,275,506.00	0	1,275,506.00
FY66	643,427.00	0	643,427.00
FY67	520,612.00	0	520,612.00
FY69	267,502.30	0	267,502.30

TABLE LXVII Concluded - SCOUT FY 1971 OBLIGATIONS

July 1, 1971

REIMBURSABLES Continued	OBLIGATED THRU FY70	OBLIGATED FY71	TOTAL OBLIGATED
Air Force 63-32			
FY62	$ 456,298.00	$ 0	$ 456,298.00
FY63	1,488,000.00	0	1,488,000.00
Air Force 65-42			
FY65	$ 200,000.00	$ 0	$ 200,000.00
FY66	200,000.00	0	200,000.00
Navy (Air Force 63-29)			
FY62	$ 975,670.00	$ 0	$ 975,670.00
FY63	3,446,452.00	18,548.00	3,465,000.00
FY64	464,000.00	0	464,000.00
FY65	1,255,299.00	0	1,255,299.00
FY66	1,086,380.58	0	1,086,380.58
FY69	217,031.41	0	217,031.41
FY69 Direct	158,350.00	0	158,350.00
Navy (Air Force 66-95)			
FY67	$ 8,545,514.31	$ -304,172.48	$ 8,241,341.83
FY68	1,952,239.00	209,619.03	2,161,858.03
FY71	0	4,345.24	4,345.24
FY67 Direct	210,372.00	0	210,372.00
FY68 Direct	164,200.00	0	164,200.00
FY70 Direct	134,250.00	0	134,250.00
Navy			
FY61	$ 1,800,000.00	$ 0	$ 1,800,000.00
FY62	7,899,999.12	0	7,899,999.12
AEC			
FY63	$ 2,397,563.60	$ 0	$ 2,397,563.60
Total REIMBURSABLES	$ 44,174,615.32	$ -71,660.21	$ 44,102,955.11
TOTAL OBLIGATED	$141,824,16 .83	$13,658,144.16	$155,482,304.99

TABLE LXVIII - (490) HISTORICAL COST OF A NASA SCOUT VEHICLE
(Thousands Dallars)

	PHASE II	PHASE III	PHASE IV	PHASE V
NASA TOTAL	3/10	11/14	10/25	13/15
01 HARDWARE	$ 959	$1,422	$1,180	$1,187
Vehicle	(520)	(996)	(768)	(722)
Motors	(381)	(414)	(359)	(414)
First Stage	(197)	(205)	(131)	(154)
Second Stage	(59)	(72)	(66)	(113)
Third Stage	(85)	(75)	(70)	(77)
Fourth Stage	(40)	(62)	(92)	(70)
Spares & Shipping	(58)	(72)	(53)	(51)
MISSION PECULIARS 01-04	35	13	52	58
*02 SUPPORTING ACTIVITIES	319	210	875	1,345
Supporting Services	(119)	(0)	(501)	(914)
Field Services	(200)	(202)	(318)	(419)
DCASO	(0)	(8)	(56)	(23)
**03 PRODUCT IMPROVEMENT	233	0	-4#	125
TOTAL	$1,546	$1,645	$2,103	$2,715

---

*Does not include Annual Support Costs of Program 497-90 (through Phase IV).

**Does not include Product Improvement Costs of Programs 180 or 497-90.

#Includes contractor incentive failure penalty.

NASA/DOD SCOUT - PROCUREMENT

TABLE LXIX - PHASE IV (25 VEHICLES) FINAL COST SUMMARY

	Allocation of Funds
Vehicles (-01-01)	$19,331,984.11
Motors (01-02)	8,980,605.53
First Stage	(3,267,929.50)
Second Stage	(1,669,104.76)
Third Stage	(1,741,651.40)
Fourth Stage	(2,301,919.87)
Others	1,365,177.17
Spares (01-03)	(1,275,231.86)
Shipping (01)	(89,945.31)
TOTAL (25 Scouts, not including Specials)	$29,677,766.81
COST PER SCOUT (1/25)	$1,180,361

	NASA (10)	NAVY (9)	AIR FORCE (6)	TOTAL
Vehicle Hardware (01-00)	$11,803,610	$10,623,249	$7,082,166	$29,509,025
Mission Mods (01-04)	517,769	76,170	241,634	835,573
*Supporting Activities (02-00)	9,270,914	5,874,703	913,403	16,059,020
Product Improvement (03-00)	-44,175	266,879	13,754	236,458
TOTAL (25 Scouts)	$21,548,118	$16,841,001	$8,250,957	$46,640,076
Estimated Cost per Vehicle	$2,154,811	$1,871,222	$1,375,159	
Assigned Vehicles	138,139,141 144,152,153 155,159,160 161	140,142,143 146,149,154 156,157,162	145,147,148 150,151,158	

---

*Includes DCASO and 497.

TABLE LXX - PHASE IV SUMMARY

		01 - VEHICLE HARDWARE		02 - SUPPORTING ACTIVITIES			03 - PRODUCT IMPROVEMENT		
VEHICLE NO.	PROGRAM	Hardware	Mission Peculiars	Field Services	Supporting Services	GSE		ESTIMATED USER COST	TOTAL COST
OSS		$ 0	$203,146	$838,358	$ 0	$639,808	$ 3,430	$ 1,684,742	
S-138C	SOLRAD-A	$ 1,184,000	18,657	235,057	494,895			1,202,657	
S-152C	ESRO-IIA	1,184,000	26,838	235,057	494,895			1,210,838	
S-160C	SOLRAD-B	1,184,000	19,311	235,057	494,895		233,028	1,203,311	
S-161C	ESRO-IIB	1,184,000	18,231	235,057	494,895			1,202,231	
TOTAL OSS	UNITED STATES	$ 4,736,000	$286,183	$1,778,586	$ 1,979,580	$639,808	$ 236,458		$ 9,656,615
INTERNATIONAL									
S-139C	FR-A	$ 1,184,000	$ 8,687	$ 235,057	$ 494,894			$ 1,452,640	
S-144R	S/M(Refurb.)		255,405					255,405	
*S-144CR	PAET	1,184,000		235,058	494,894			1,443,953	
S-153C	SM-B	1,184,000	26,317	235,057	494,894			1,470,270	
S-155C	UK-E**	1,184,000	6,023	235,057	494,894			1,445,191	
TOTAL OSS	INTERNATIONAL	$ 4,736,000	$296,432	$ 940,229	$ 1,979,576				$ 7,952,237
TOTAL OSS		$ 9,472,000	$582,615	$2,718,815	$ 3,959,156	$639,808	$ 236,458		$17,608,[illegible]
OAST									
S-141C	RE-E	$ 1,184,000		$ 235,058	$ 494,894			$ 1,443,954	
S-159C	RAM-C-A	1,184,000		235,058	494,894			1,443,953	
TOTAL OAST		$ 2,368,000		$ 470,116	$ 177,791				$ 3,827,904
TOTAL NASA		$11,840,000	$582,615	$3,188,931	$ 4,948,944	$639,808	$ 236,458		$21,436,756
NAVY				$ 4,816				$ 4,816	
S-140C	NAVY-5	$ 1,184,000	8,463		$ 330,814			1,459,278	
S-142C	NAVY-6	1,184,000	8,463		330,814			1,459,278	
S-143C	NAVY-7	1,184,000	8,463		330,814			1,459,278	
S-146C	NAVY-8	1,184,000	8,463		330,814			1,459,278	
S-149C	NAVY-9	1,184,000	8,463		330,814			1,459,277	
S-154C	NAVY-10	1,184,000	8,463		330,814			1,459,277	
S-156C	NAVY-11	1,184,000	8,463		330,814			1,459,277	
S-157C	NAVY-12	1,184,000	8,463		330,814			1,459,277	
S-162C	NAVY-13	1,184,000	8,463		330,815			1,459,277	
TOTAL NAVY		$10,656,000	$ 76,170	$ 4,816	$ 2,977,327				$13,714,313
AIR FORCE									
S-145C	62-6 AF OV3-1	$ 1,184,000	$ 40,272		$ 166,197			$ 1,312,506	
S-147C	62-6 AF OV3-4	1,184,000	40,272		166,197			1,312,506	
S-148C	62-6 AF OV3-3	1,184,000	40,272		166,197			1,312,506	
S-150C	62-6 AF OV3-2	1,184,000	40,272		166,197			1,312,506	
S-151C	62-6 AF OV3-5	1,184,000	40,273		166,197			1,312,506	
S-158C	62-6 AF OV3-6	1,184,000	40,273		166,197			1,312,507	
TOTAL AIR FORCE		$ 7,104,000	$241,634		$ 913,403				$ 8,259,037
TOTAL DOD		$17,760,000	$317,804	$ 4,816	$3,890,730				$21,973,350
TOTAL USERS COSTS PHASE IV		$29,600,000	$900,419	$3,193,747	$ 8,839,674	$639,808	$ 236,458		$43,410,106

---

*Incomplete.

**Does not include $80,000 of 870 Funds.

TABLE LXXI - PHASE IV PROGRAM EXPENDITURES (25 SCOUTS)

-01 HARDWARE

VEHICLE EXPENDITURES (01-01)

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
50.050.085	L-61746	Blast Shield Hardware	PF	$ 10,000.00
50.050.085	L-61746-4	Blast Shield Hardware	PF	-2,488.17
50.050.133	L-61746-7	Blast Shield Drill Jig	PF	471.31
53.110.364	L-70739	Blast Shield Tooling Plate	PF	1,248.98
01.030.018	L-71202-20	Install Silicone on Blast Shield	PF	175.00
01.030.024	L-71203-58	RTV-60 and RTV-11 Silicone Rubber	PF	500.00
01.030.026	L-71204-2	Applic. ATV 60811 to Blast Shield	PF	250.00
01.030.027	L-71205-19	Aircraft Fabricators	PF	250.00
01.030.021	L-71227-12	RPD-150 Strips	PF	383.07
01.030.034	L-80283-23	Coat Blast Shield	PF	250.00
01.030.034	L-81957-22	Apply RTV to Blast Shield	PF	250.00
53.340.507	L-95861	Hardware	PG	661.20
60.400.803	L-1360400803	Tools	PH	173.26
P2Y-079	NAS1-1295-11	Scout Vehicles	RB	3,661,143.00
P26-079	NAS1-1295-14(c4)	Algol Improvement	RB	95,462.00
P38-026	NAS1-1295-18	Reliability	RB	201,000.00
20.200.286	NAS1-1295-32(c75)	34-inch Heat Shield, A-14	YE	31,012.00
20.200.365	NAS1-1295-34(c79)	Section C Tests	RB	150,000.00
20.200.395	NAS1-1295-34(c79)	Environ. Test Program	RB	75,000.00
20.200.525	NAS1-1295-34(c79)	Environ. Test Program	RB	92,566.00
P2Y-079	NAS1-1295-35	S-137 Checkout Eliminated	RB	-3,333.00
20.200.398	NAS1-1295-36(c82)	Colvin Pressure Trans.	RB	45,000.00
60.400.585	NAS1-1295-41	Overrun	PF	22,597.00
LR1-726	NAS1-1295	Scout Vehicles	NB	1,032,907.40
20.200.483	NAS1-2650-3	Painting	PD	1,089.00
20.200.193	NAS1-2650-3(c1)	Guidance System Filter Mod.	PYC	24,887.00
20.200.629	NAS1-2650-4(c6)	Connector Mods	RC	3,619.00
20.200.677	NAS1-2650-5(c7)	Add. Funds, Colvin Press. Trans.	RB	13,181.00
60.400.142	NAS1-2650-6	Jet Vane Shafts and Fin Tips	PE	1,090.00
20.200.004	NAS1-2650-7	Canceled Completion of Contract	YC	-162,460.00
60.400.021	NAS1-2650-10(c12)	Motor Valves	PE	10,757.00
60.400.070	NAS1-2650-10(c12)	Motor Valves	PE	6,582.00
20.200.004	NAS1-2650-12	Scout Vehicles	YC	-62,409.00
20.200.004	NAS1-2650-13	Final Contract Price Adjustment	PM	34,754.00
20.200.004	NAS1-2650	Scout Vehicles	PYCPF	7,375,009.05
20.200.398	NAS1-2650	Colvin Pressure Trans.	PD	40,000.00
20.200.533	NAS1-3589-2(c1)	Relays in S-124, S-128	RB	4,250.00
20.200.573	NAS1-3589-3	Recertification S-130 Series	RB	29,000.00
60.400.069	NAS1-3589-4	Recertification	PE	146,922.00
60.400.186	NAS1-3589-9	Vehicle Recert. Requirement	RBCDYE	99,334.00
60.400.196	NAS1-3589-9	S3T Checkout, S-138	PE	23,378.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

VEHICLE EXPENDITURES (01-01) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.234	NAS1-3589-9	Recertification	PYE	$ 299,890.00
20.200.619	NAS1-3589-11(c11)	Veh. Vib. Mod. Kits, S-138, S-139	PE	27,668.00
60.400.014	NAS1-3589-13(c16)	Inv. and Test Sup. S-128R Failure	RB	17,000.00
60.400.210	NAS1-3589-16(c37)	Fab. Heat Shield A-26 for SOLRAD	PE	1,817.00
60.400.342	NAS1-3589-18(c46)	2 Transducers	PE	2,000.00
60.400.393	NAS1-3589-18	Overrun	RCE	12,928.00
60.400.404	NAS1-3589-19	Overrun	RE	59,804.00
60.400.437	NAS1-3589-19	Support Recert. Program	PF	132,369.00
60.400.414	NAS1-3589-20(c47)	Mod. Heat Shield A-14	YE	7,000.00
60.400.514	NAS1-3589-20(c47)	Torque Tube, A-14	PF	7,871.00
60.400.427	NAS1-3589-20(c48)	Rechecking B-Section, S-138R	PF	18,000.00
60.400.458	NAS1-3589-20(c50)	Mods. Spin Brgs., S-138R, S139-S150	PF	1,000.00
60.400.645	NAS1-3589-21	Overrun	RF	82,014.00
60.400.359	NAS1-3589-22	Completion of Contract	PJ	13,778.00
60.400.199	NAS1-3589-23	Final Contract Price Adjustment	PM	11,200.00
60.400.275	NAS1-3589-23	Final Contract Price Adjustment	PI	10,560.00
60.400.308	NAS1-3589-23	Final Contract Price Adjustment	PM	10,952.00
20.200.509	NAS1-3589	Recertification S-120 Series	RB	183,500.00
60.400.962	NAS1-3899-17-4	Completion of Contract	PJ	298.00
60.400.273	NAS1-3899-26	Heat Shield Ejection Test, A-26	PE	9,150.00
60.400.360	NAS1-3899-39	Configuration H.S. A-28/FR-1	PF	13,300.00
60.400.396	NAS1-3899-39	A-28 Heat Shield	PF	5,700.00
60.400.335	NAS1-4325-4(c4)	Tests of Guid. Sys. Cap., S^3T	PEF	5,649.00
60.400.340	NAS1-4325-4(c4)	Tests of Guid. Sys. Cap., S^3T	PE	3,000.00
60.400.440	NAS1-4664-1	Fin Tip Mods.	PF	3,000.00
60.400.453	NAS1-4664-1	Fin Tip Mods.	PF	1,384.00
60.400.419	NAS1-4664-1(c1)	Safe Arm Bags	PF	2,220.00
60.400.199	NAS1-4664-5	Support Services for Phase IV	PFNG	606,442.68
60.400.447	NAS1-4664-7	Spin Bearing, S-143C D Section	PF	497.00
60.400.457	NAS1-4664-7	Mod. Kits	PF	3,114.00
60.400.458	NAS1-4664-7(c2)	Mods. Spin Bearings, S138R,S139-150	PF	4,000.00
60.400.479	NAS1-4664-7(c2)	Spin Bearing Mods.	PF	11,808.00
60.400.506	NAS1-4664-8	S & M, Add. Vehicles	PEFNG	837,025.00
60.400.451	NAS1-4664-9-Ca4	Battery Cells	PF	1,700.00
60.400.469	NAS1-4664-10	Stat. Bal. Upper D Sect., S140-S151	PF	2,899.00
60.400.550	NAS1-4664-10(c3)	3 Calibration Units	PF	10,528.00
60.400.451	NAS1-4664-14-Ca6	Spin Motors	PF	75,205.00
60.400.451	NAS1-4664-14-Ca13	Circle Seal Valves	PF	930.00
60.400.568	NAS1-4664-15	New GSE at Dallas	PF	39,045.00
60.400.457	NAS1-4664-18	Mod. Kits	PF	-2,203.00
60.400.506	NAS1-4664-18	Serv. and Mat.,Add. Vehicles	PF	-7,887.00
60.400.568	NAS1-4664-18	New GSE at Dallas	PF	-12,977.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

VEHICLE EXPENDITURES (01-01) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.648	NAS1-4664-18(c6)-J	Applic. Cork to Base A Fins, S-150	PG	$ 4,000.00
60.400.651	NAS1-4664-18(c6)-J	Applic. Cork Base A Fins	PF	6,697.00
60.400.797	NAS1-4664-22-A	Incentive Fee	PHRI	267,802.00
60.400.963	NAS1-4664-24	Overrun	PJ	132,818.00
60.400.199	NAS1-4664-25	Final Contract Price Adjustment	PFJ	20,888.00
60.400.506	NAS1-4664-25	Final Contract Price Adjustment	PEFJ	8,515.00
60.400.199	NAS1-4664	Sustaining Engineering	PD	121,963.50
60.400.199	NAS1-4664	Veh. C/O & Delivery (S139-S150)	RCDRYENG	1,241,786.82
60.400.621	NAS1-5610-2	Scout Vehicle	RCEF	13,614.38
53.110.275	NAS1-5478	Blast Shields, Magnesium	RE	5,445.75
60.400.668	NAS1-6020-2-J	Applic.Cork to S-156, S-162	PEG	1,884.28
60.400.668	NAS1-6020-2-J	Applic.Cork to S-156, S-162	PG	2,474.72
60.400.557	NAS1-6020-3-J	Vehicle Mod. Checkout	RFPHI	99,056.61
60.400.649	NAS1-6020-8-Ca10-L	Optical Aline. Assy's, S155-S162	NG	2,000.00
60.400.557	NAS1-6020-9-H	Support to Vehicle Checkout	PH	141,772.74
60.400.557	NAS1-6020-9-J	Vehicle Mod Checkout	SH	981,577.22
60.400.557	NAS1-6020-9-K	Vehicle Checkout	PH	82,253.74
60.400.718	NAS1-6020-10(c3)-K	Heat Shield Mods. and Fit Check	PG	14,719.00
60.400.788	NAS1-6020-15-J	Vehicle Mod. Checkout	PH	13,001.00
60.400.804	NAS1-6020-15-K	Vehicle Checkout	PH	5,380.00
60.400.796	NAS1-6020-18(c6)-J	Base A Mods., S-160-S-162	PF	395.00
60.400.796	NAS1-6020-18(c6)-K	Vehicle Checkout	PH	1,000.00
60.400.860	NAS1-6020-29(M23)-K	Ext. Shelf Life EX-38 Press Ctg.	RC	27.41
60.400.884	NAS1-6020-30-Ca51-E	Vehicle Mod. Checkout	PI	4,769.75
60.400.898	NAS1-6020-31-J	Vehicle Mod. Checkout	SHPI	6,720.00
60.400.557	NAS1-6020-J	Vehicle Mod. Checkout	RBFSGPI	211,633.87
60.400.557	NAS1-6020-K	Vehicle Checkout	RFSG	104,325.37
60.400.511	NAS1-6048	Repl. 4th Stg.Crad.Assy.&Mod.Kits	PEF	8,907.17
60.900.051	NAS1-6935-41	Heat Shield S-144	PJ	66,000.00
60.400.931	NAS1-10000-R-2	S-144 PAET Reentry	PK	961.00
60.400.931	NAS1-10000-17-V	Tooling and GSE Maintenance	PK	2,489.43
60.400.931	NAS1-10000-H	Vehicle Processing	PK	112,997.00
60.400.931	NAS1-10000-V	Tooling and GSE Maintenance	PK	26,467.57
		TOTAL VEHICLE EXPENDITURES		$19,331,984.11

MOTORS EXPENDITURES (01-02)

FIRST STAGE

20.200.721	L-47781	Algol IIB 23 Radiographic Inspect.	YC	$ -337.04
P2Z-068	NAS1-1330-1	Algols	RBC	585,377.63
P10485	NAS1-1330-5(c9)	Algol IIA Overrun	RB	7,432.54
20.200.340	NAS1-1330-7	Algol IIA Stretchout	RC	33,060.00
20.200.227	NAS1-1330-8	Algol IIA Static Motor	RC	34,616.00
20.200.467	NAS1-1330-8	Algol IIA Increase	RC	41,928.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTORS EXPENDITURES (01-02) Continued

FIRST STAGE Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
20.200.550	NAS1-1330-11(c11)	Algol IIA Igniter Mod. Cost Incr.	RC	$ 4,362.00
20.200.228	NAS1-1330-12(c12)	Algol IIA Nozzles	RC	20,000.00
60.400.364	NAS1-1330-15(c15)	Removal Noz. 206 from Algol IIB 23	RE	851.00
60.400.369	NAS1-1330-15(c16)	Repair Algol IIB 210 Nozzle	RE	4,728.00
P22-040	NAS1-1330	Underrun	RYCRYENG	-35,822.74
60.400.388	NAS1-3833-2	Algol IIB Jet Vane Firing	PF	10,814.00
60.400.181	NAS1-3833-3	Change in Algol Ship. Procedures	PE	7,500.00
60.400.454	NAS1-3833-3	NDT Specs., Algol IIB	SF	3,520.00
60.400.466	NAS1-3833-3	Algol IIB Ign. Locking Device	PE	5,384.00
60.400.471	NAS1-3833-3	Shipment Algol IIB 37	PE	680.00
60.400.278	NAS1-3833-3(c4)	Algol IIB Qual. Program	PE	1,173.00
60.400.109	NAS1-3833-3(c7)	Algol IIB Igniter Locking Device	PE	2,500.00
60.400.417	NAS1-3833-3(c8)	Special Shipment, Algol IIB 37	PE	300.00
60.400.122	NAS1-3833-4	Algol Overrun	NG	294,847.00
20.200.520	NAS1-3833	24 Algol IIB Motors	PEF	1,891,259.00
60.400.534	NAS1-4664-10	Press. Chk. Caps., 1st & 2nd Stgs.	PF	5,966.00
60.400.176	NAS1-4785	10 Algol Handling Dollies	PE	35,630.00
60.400.473	NAS1-4794-2	Shipment Algol IIB 40	PF	1,000.00
60.400.474	NAS1-4794-2	Shipment Algol IIB 38	PF	1,000.00
60.400.515	NAS1-4794-3	Shipment Algol IIB 41 and 44	YE	2,000.00
60.400.370	NAS1-4794-4	Storage and Shipment Algol IIB 37-58	RE	8,253.00
60.400.430	NAS1-4794-4	Storage and Shipment Algol Motors	PF	1,548.11
60.400.541	NAS1-4794-4	Stor. and Hand. Algol IIB Motors	PF	3,368.00
60.400.567	NAS1-4794-6	Radiographic Inspect., Algol IIB 39	RB	2,650.00
60.400.600	NAS1-4794-8	Radiographic Inspect., Algol IIB 42	PF	2,650.00
60.400.619	NAS1-4794-9	Mods. Algol Handling Dollies	PG	3,150.00
60.400.673	NAS1-4794-9	Mods., Algol Handling Dollies	SG	1,550.00
60.400.783	NAS1-4794-9-2(c2)	Mods., Algol Handling Dollies	PH	2,800.00
60.400.685	NAS1-4794-10	Algol IIB Test	SG	4,502.00
60.400.682	NAS1-5610-4(c2)	Algol Initiator	PG	2,114.00
60.400.443	NAS1-5610	2 Algol Rocket Motors	PFG	276,678.00
60.400.675	NAS1-6020-16-Ca20-S	Prepare Algol IIB for Shipment	NH	-426.00
60.400.675	NAS1-6020-16-Ca30-S	Exchange Algol IIB Motor Nozzles	NH	-51.00
60.400.773	NAS1-6020-16-Ca31-S	Replac. Algol II Nozzle on S-157	NH	-165.00
60.400.675	NAS1-6020-16-Ca34-S	Rework Algol IIB, S-160	NH	-357.00
60.400.773	NAS1-6020-19-Ca49-S	Rework Algol IIB-55 Igniter Slv.	NG	-103.00
		MOTORS - FIRST STAGE SUBTOTAL		$3,267,929.50

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTORS EXPENDITURES (01-02) Continued

SECOND STAGE

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
P22-045	L-2061	Castor Reject	RB	$ 60,000.00
P12-132	L-2061-12	Castor Reject	RB	-45,541.99
20.200.190	L-15993-1	Castor II Increase	SF	422.75
60.400.491	NAS1-4793-4	Lifting Bands, Castor IIA	PF	760.00
60.400.537	NAS1-4793-6	Dummy Castor II Motor	PF	2,900.00
60.400.591	NAS1-4793-6	Dummy Castor II Assembly	PF	1,600.00
60.400.632	NAS1-4793-8	Repair Castor II	PG	1,052.00
60.400.639	NAS1-4793-9	Castor II S/N 2 Case	PG	4,212.00
60.400.439	NAS1-5034-2(c2)	Castor II Nozzle Invest.	PF	2,914.00
60.400.121	NAS1-5034-4	Final Contract Cost Adjustment	YE	-3,209.00
60.400.121	NAS1-5034	Castor II Motors	PE	760,000.00
60.400.325	NAS1-5034	10 Castor Motors	YDPYEPG	176,575.00
60.400.443	NAS1-5610	7 Castor II Rocket Motors	NG	70,947.00
60.400.532	NAS1-5883-2(c1)	1 Castor Rocket Motor (LTV)	PG	-5,981.00
60.400.532	NAS1-5883-2(c6)	1 Castor Rocket Motor (LTV)	PG	-3,766.00
60.400.688	NAS1-5883-6(c11)	Refurb. Castor Motor Shipping Cont.	PG	4,415.00
60.400.532	NAS1-5883	11 Castor Motors (LTV)	PFG	642,636.00
60.400.675	NAS1-6020-16-Ca39-S	Rework Castor II Motor Tool	NH	-633.00
60.400.773	NAS1-6020-19-Ca45-S	9 Batch Test Mtrs. Castor II	NG	-140.00
60.400.773	NAS1-6020-19-Ca57-S	X-ray Castor Nozzle	NG	-58.00
		MOTORS - SECOND STAGE SUBTOTAL		$1,669,104.76

THIRD STAGE

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
P38-002	L-3920-4	X-259 Replacement Rejects	RC	$ 25,267.00
P39-004	L-3920-4	X-259 Replacement Rejects	RC	2,000.00
20.200.106	L-3920-9	X-259 Shipping Containers	RC	7,143.00
20.200.111	L-3920-9	X-259 HPC-119 Repairs	RC	286.00
20.200.113	L-3920-9	X-259 Overrun	RC	63,075.00
20.200.168	L-3920-10	X-259 Overrun	RB	75,066.00
20.200.451	L-3920-12	X-259 Overrun	PD	22,156.00
20.200.113	L-3920-14	X-259 Underrun	RC	-66,500.00
20.200.113	L-3920-15	X-259 Correction to Amend. 14	YI	6,500.00
20.200.669	L-35506	Storage of Casting Powder	YE	718.00
60.400.468	L-75981	X-Ray X-259 Nozzle	SF	237.98
60.400.635	L-84995	Casting Powder, X-259 Motor	PG	5,160.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTOR EXPENDITURES (01-02) Continued

THIRD STAGE Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.635	L-84995-1	X-259 Casting Powder	PG	$ -50,000.00
01.030.069	L-84999	X-259 Motor Test at NORD	SH	13,800.00
60.400.761	L-84999	X-259 Motor Test at NORD	SH	8,700.00
20.200.370	NAS1-2650-3(c5)	X-259 Motor Compat. Change	YC	7,405.00
20.200.518	NAS1-3493-2	X-259 Tooling	PF	50,000.00
60.400.323	NAS1-3493-2	X-259 Tooling	PF	14,657.00
20.200.518	NAS1-3493-3	Conversion X-259A3's to X-259A6's	RE	33,680.00
60.400.287	NAS1-3493-3	Rubber Boots, X-259 Igniters	YE	426.00
60.400.490	NAS1-3493-3(c3)	X-259 Production Delay	PF	2,343.00
60.400.517	NAS1-3493-3(c3)	X-259 Program Extension	PF	957.00
60.400.448	NAS1-3493-4(c7)	X-259 Igniter Redesign, Phase I	SF	9,000.00
60.400.449	NAS1-3493-4(c7)	X-259 Igniter Redesign, Phase II	SF	35,000.00
60.400.452	NAS1-3493-4(c7)	X-259 Design, Phase I	SF	6,000.00
60.400.460	NAS1-3493-4(c7)	X-259 Igniter Redesign, Phase II	SF	35,000.00
60.400.578	NAS1-3493-4(c7)	X-259 Igniter Mods.	SF	6,067.00
60.400.520	NAS1-3493-6(c8)	Test Program, Modified X-259 Igniter	SF	4,322.00
60.900.100	NAS1-3493-10	Termination	PJ	3,709.00
20.200.249	NAS1-3493	X-259 Quality Control Test	PYCPDYE	43,500.00
20.200.252	NAS1-3493	Reject Replacement (X-259)	RB	11,910.00
20.200.253	NAS1-3493	X-259A3 Spare Components	YCEPF	13,085.00
20.200.506	NAS1-3493	27 X-259A3 Motors	NRYBPRYCPRYDPRYEPF	684,989.61
60.400.141	NAS1-4321-1	X-259 Nozzle Checkout	PE	2,000.00
60.400.350	NAS1-4795-2	X-259 Support Engineering	PF	25,000.00
60.400.349	NAS1-4795-3	Conf. X-259A2 Rocket Motors	PF	6,000.00
60.400.374	NAS1-4795-3	Refurb. X-259A2 Motors	RBCE	8,400.00
60.400.519	NAS1-4795-3-1(c1)	Inspect. X-259 Rocket Motor	PF	3,000.00
60.400.579	NAS1-4795-3-1(c1)	Mod. X-259 Rocket Motors	PF	984.00
60.400.590	NAS1-4795-5	X-258, X-259 Doc. Review	PF	30,000.00
60.400.589	NAS1-4795-5-2	X-258, X-259 Doc. Review	PF	2,400.00
60.400.611	NAS1-4795-5-2	X-258, X-259 Doc. Review	PF	1,326.00
60.400.590	NAS1-4795-5-3	X-258, X-259 Doc. Review	PG	3,000.00
60.400.725	NAS1-4795-5-3	X-258, X-259 Doc. Review	PGH	20,485.00
60.400.623	NAS1-4795-8	Insp.& Del.X259, HPC-151, HPC-186	PG	10,415.00
60.400.732	NAS1-4795-8-1	Mods. to X-259 HPC-186	PH	3,398.00
60.400.627	NAS1-4795-9	Rework X-258, X-259 Nozzles	RF	5,645.00
60.400.678	NAS1-4795-10-1	X-258 & X-259 Tech. Support	SG	58,955.00
60.400.709	NAS1-4795-10-2	X-258 & X-259 Tech. Support	SG	35,174.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTOR EXPENDITURES (01-02) Continued

THIRD STAGE Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.621	NAS1-5610-2	Antares X-259 Motors	PHRI	$ 53,480.62
60.400.443	NAS1-5610	1 Antares X-259 Motor	SE NGPH	62,454.00
60.400.684	NAS1-5883-2(c7)	Qual. of X-259 Containers	RF	355.00
60.400.532	NAS1-5883	8 X-259A3 Motors (LTV)	PF	263,929.50
60.400.532	NAS1-5883	2 X-259 Igniters (LTV)	PF	6,420.00
60.400.532	NAS1-5883	2 X-259 Chambers (LTV)	PF	33,672.00
60.400.729	NAS1-6020-16-Ca18-S	Reinspection of 4 X-259 Motors	PH	18,000.00
60.400.675	NAS1-6020-16-Ca18-S	Reinspection of 5 X-259 Motors	NH	-2,202.00
60.400.675	NAS1-6020-16-Ca35-S	Machining X-259 Nozzles	NH	-1,285.00
60.400.773	NAS1-6020-19-Ca36-S	Prep. X-259 Chmbr. for Shipping	NG	-43.00
60.400.773	NAS1-6020-19-Ca56-S	Fab. Aft Insul.Mold,X-259 Mtrs.	NG	-690.00
60.400.597	NAS1-6444	X-259 Assembly Tooling	PF	22,999.00
		MOTORS - THIRD STAGE SUBTOTAL		$1,748,931.71

FOURTH STAGE

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
01.030.067	L-353110497	FW-4S Shipping Rings	PG	$ 1,850.00
01.030.068	L-4-53120-592	FW-4S Shipping Containers	SG	420.00
01.030.067	L-1553110580	FW-4S Shipping Rings	PG	67.66
60.400.060	NAS1-3698-2	X-258 Tooling	PE	60,300.00
60.400.174	NAS1-3698-2	Incr. Q.C. Source Insp., X-258	PE	11,765.00
20.200.646	NAS1-3698-3	2 X-258E Motors	PE	64,028.00
60.400.182	NAS1-3698-6(c9)	Add. of Swatches on X-258 Motors	PE	6,500.00
60.400.207	NAS1-3698-7(c12)	X-258 EP-87 Swatches	PE	500.00
60.400.406	NAS1-3698-7(c12)	X-258 EP-87 Swatches	YE	2,422.00
60.400.328	NAS1-3698-8	X-258 Rocket Motor Overrun	PDPRE	405,620.99
60.400.392	NAS1-3698-9	X-258 Initiator Check	PEF	1,621.00
60.400.429	NAS1-3698-9	X-258 Locking Collar Tooling	PE	4,574.00
60.400.432	NAS1-3698-9	Shipment Fired X-258 Nozzle	SF	46.00
60.400.436	NAS1-3698-9	X-258 Locking Collar	PF	1,915.00
60.400.297	NAS1-3698-9(c19)	X-ray X-258 Inhibitor Tubes	PE	-3,538.00
60.400.301	NAS1-3698-9(c20)	Mod. X-258 RH-86 for Delta	PE	-355.00
60.400.345	NAS1-3698-9(c23)	X-258 RH-85 Nozzle Change	PE	-1,481.00
60.400.139	NAS1-3698-10	X-258 RH-100 Postfiring	PF	767.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTORS EXPENDITURES (01-02) Continued

FOURTH STAGE Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.505	NAS1-3698-10	Postfiring Eval. X-258 RH-100	SF	$ 4,077.00
60.400.235	NAS1-3698-10(c21)	Salvage of Unreinforced X-258 Ign.	PE	3,858.00
60.400.289	NAS1-3698-10(c21)	Hardware for X-258 Igniters	PE	-3.00
60.400.322	NAS1-3698-10(c21)	X-258 Igniters	PE	27,036.00
60.400.431	NAS1-3698-10(c27)	X-258 Mods. for AFOUI	PF	-3,706.00
60.400.582	NAS1-3698-11(c25)	Igniter Mods., X-258	SF	108,586.00
60.400.555	NAS1-3698-11(c29)	X-258 Rocket Motors	PF	-278.00
60.400.503	NAS1-3698-11(c30)	Firing SD60A1 Initiators, X-258	SF	4,066.00
60.400.513	NAS1-3698-11(c31)	X-258 RH-110 Flightworthiness Test	PF	2,990.00
60.400.609	NAS1-3698-13	Static Test, X-258 RH-111	SF	17,046.00
60.400.546	NAS1-3698-13(c34)	X-258 Rocket Motor	SF	6,500.00
60.400.560	NAS1-3698-13(c34)	Static Test, X-258 RH-111	SF	2,000.00
60.400.521	NAS1-3698(c2)	Instl. Temp.Recs., X-258 Ship.Conts.	PF	1,400.00
60.400.415	NAS1-3698(c25A)	Redesign X-258 Igniters	SF	5,276.52
20.200.237	NAS1-3698	X-258 Motors	PD	31,458.00
20.200.239	NAS1-3698	X-258 Motors	YC	48,000.00
20.200.239	NAS1-3698	X-258 Termination	YC	-18,548.00
20.200.242	NAS1-3698	X-258B2 Motors for Q.C.	PDRBYC	36,400.00
20.200.243	NAS1-3698	X-258 Spare Components	RYCPYD	14,937.70
60.400.630	NAS1-4795-2-1	X-258, X-259 Motors Sust. Engrg.	SG	22,460.00
60.400.636	NAS1-4795-2-1	X-258, X-259 Motors Sust. Engrg.	SG	9,288.00
60.400.629	NAS1-4795-10	X-258 and X-259 Technical Support	SG	8,804.00
60.400.709	NAS1-4795-10-2	X-258 and X-259 Tech. Support	SG	1,826.00
60.400.730	NAS1-4795-10-2	X-258 and X-259 Technical Support	SG	16,577.00
60.400.701	NAS1-5883-2	Rework X-259 Shipping Containers	SG	527.00
60.400.686	NAS1-5883-3	X-258 Motors	NG	144,300.00
60.400.652	NAS1-5883-6(c5)	Tests, FW-4S Motor Nozzle Inserts	SG	16,000.00
60.400.731	NAS1-5883-7(c13)	Burst Test on New FW-4S Motor Case	NSG	25,200.00
60.400.779	NAS1-5883-7(c17)	Nozzle Inserts, FW-4S Motors	NG	-2,400.00
60.400.700	NAS1-5883-6(c9)	FW-4S Motor Nozzles	PFRG	350,000.00
60.400.710	NAS1-5883-6(c9C)	Mod. FW-4S Nozzles	NG	10,000.00
60.400.532	NAS1-5883	4 FW-4S Motors (LTV)	PF	226,979.00
60.400.532	NAS1-5883	10 FW-4S Initiators (LTV)	PF	3,900.00
60.400.532	NAS1-5883	2 FW-4S Igniters (LTV)	PF	1,168.00
60.400.532	NAS1-5883	1 FW-4S Nozzle Assembly (LTV)	PF	3,374.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTORS EXPENDITURES (01-02) Continued

FOURTH STAGE Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.543	NAS1-5883	3 X-258 Motors (LTV)	PF	$ 353,790.00
60.400.595	NAS1-5883	5 FW-4S Motors (LTV)	PF	230,811.00
60.400.675	NAS1-6020-16-Ca21-S	Qual. Test, X-258E6	NH	-6,089.00
60.400.675	NAS1-6020-16-Ca23-S	3rd & 4th Stg. Init. Dev. Prog.	NH	-1,991.00
60.400.773	NAS1-6020-19-Ca37-S	Dir. Margin of Safety Prog.X-258	NG	3,200.00
60.400.773	NAS1-6020-19-Ca37-S	X-258 Aging Process	NG	-432.00
60.400.773	NAS1-6020-19-Ca41-S	Fourth-Stage Initiators	NG	-477.00
60.400.773	NAS1-6020-19-Ca47-S	Instrumentation FW-4S Motors	NG	-398.00
60.400.773	NAS1-6020-19-Ca54-S	Removal of X-258 Nozzle	NG	2,202.00
60.400.833	NAS1-6020-35-Ca69-S	Prep. X-258 Mtr. for Shipment	NG	3,585.00
60.400.707	NAS1-7314	X-258 Nozzle Retainer Ring Molding	SG	15,000.00
60.400.714	NAS1-7314	X-258 Retainer Ring Molding	SG	10,000.00
60.400.717	NAS1-7314	X-258 Retainer Ring Molding	SG	6,597.00
		MOTORS - FOURTH STAGE SUBTOTAL		$2,301,919.87
		TOTAL MOTOR EXPENDITURES		$8,987,885.84

SPARES EXPENDITURES (01-03)

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.387	L-61691	Spares Repair	PG	$ 76,902.00
60.400.653	L-84997	Spares Repair	PFPNGPH	100,000.00
60.400.816	L-84997	Spares	PH	17,101.00
60.400.199	NAS1-1970-10	Final Contract Price Adjustment	PJ	231.00
20.200.420	NAS1-3420-3(c6)	Spares	YCPRD	154,838.00
60.400.036	NAS1-3420-7	Spares and Logistics	PE	137,432.00
60.400.027	NAS1-3420-8(c18)	2 Radar Beacons	PDE	13,917.00
60.400.028	NAS1-3420-8(c21)	Spares and Logistics	PE	76.00
60.400.028	NAS1-3420-8(c23)	Spares and Logistics	PE	3,933.00
60.400.227	NAS1-3420-9	Spares and Logistics	PE	74,885.00
60.400.028	NAS1-3420-10	Spares and Logistics	PE	30,288.00
60.400.028	NAS1-3420-10(c1)	Spares and Logistics	PE	36,016.00
60.400.028	NAS1-3420-10(c22)	Spares and Logistics	PE	128.00
60.400.028	NAS1-3420-10(c24)	Spares and Logistics	PE	176.00
60.400.251	NAS1-3420-11	Spares	PE	13,800.00

TABLE LXXI Continued - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

SPARES EXPENDITURES (01-03) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.028	NAS1-3420-12	Spares and Logistics	PE	$ -3,025.00
60.400.028	NAS1-3420-12(c25)	Spares and Logistics	PE	5,796.00
60.400.251	NAS1-3420-14	Spares	PF	6,615.00
60.400.028	NAS1-3420-14(c27)	Spares and Logistics	PCDE	5,296.67
60.400.251	NAS1-3420-15	Spares	PE	-2,933.00
60.400.260	NAS1-3420-16(c26)	Trans. E-Section T/M Spares	PE	12,500.00
60.400.251	NAS1-3420-16(c30)	Spares	PF	14,256.00
60.400.227	NAS1-3420-17	Underrun	PE	-18,000.00
20.200.148	NAS1-3420	Spares	PC	70,038.19
60.400.451	NAS1-4664-9	Replacement of Spares	PF	-77.00
60.400.451	NAS1-4664-9-Ca1-1	Replacement of Spares	PF	479.00
60.400.451	NAS1-4664-9-Ca2-1	Replacement of Spares	PF	5,191.00
60.400.451	NAS1-4664-9-Ca5	Replacement of Spares	PF	1,600.00
60.400.451	NAS1-4664-9-Ca7	Replacement of Spares	PF	700.00
60.400.451	NAS1-4664-14-Ca3	Replacement of Spares	PF	9,420.00
60.400.451	NAS1-4664-14-Ca6	Replacement of Spares	PF	10,410.00
60.400.451	NAS1-4664-14-Ca9	Replacement of Spares	PF	3,200.00
60.400.451	NAS1-4664-14-Ca10	Replacement of Spares	PF	7,175.00
60.400.451	NAS1-4664-14-Ca11	Replacement of Spares	PF	298.00
60.400.451	NAS1-4664-14-Ca13	Replacement of Spares	PF	545.00
60.400.451	NAS1-4664-17-Ca8	Replacement of Spares	PF	5,200.00
60.400.451	NAS1-4664-17-Ca12	Procurement of Spares	PFG	37,424.00
60.400.451	NAS1-4664-17-Ca14	Replacement of Spares	PF	14,000.00
60.400.451	NAS1-4664-17-Ca15	Replacement of Spares	PF	640.00
60.400.451	NAS1-4664-17-Ca16	Replacement of Spares	PF	63,495.00
60.400.451	NAS1-4664-17-Ca17	Replacement of Spares	PF	68,379.00
60.400.451	NAS1-4664-17-Ca18	Replacement of Spares	PF	4,221.00
60.400.451	NAS1-4664-17-Ca19	Replacement of Spares	PF	150.00
60.400.602	NAS1-4664-17-Ca19	Procurement of Spares	PG	1,300.00
60.400.451	NAS1-4664-19(c20)	Procurement of Spares	PFG	410.00
60.400.602	NAS1-4664-19(c21)	Procurement of Spares	PFG	3,130.00
60.400.451	NAS1-4664-21-17	Spares	PH	-825.00
60.400.451	NAS1-4664-21-Ca23	Repair MIG Gyro	PGH	15,368.00
60.400.451	NAS1-4664-21-Ca24	Spares	PH	4,057.00
60.400.575	NAS1-4793-7	Spares, Castor IIA	PF	800.00
60.400.607	NAS1-4793-7	Spares, Castor II	PF	1,699.00
60.400.576	NAS1-4794-7	Spares, Algol IIB	PF	50.00
60.400.577	NAS1-4795-7	Spares, X-258 and X-259	PF	240.00
60.400.610	NAS1-4795-7	Spares, X-258 and X-259	PF	1,288.00

TABLE LXXI Concluded - PHASE IV PROGRAM EXPENDITURES

-01 HARDWARE Continued

SPARES EXPENDITURES (01-03) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.557	NAS1-6020-3-L	Logistics Support	RG	$ 81,847.00
60.400.741	NAS1-6020-7-L	Spares	PG	22,107.00
60.400.649	NAS1-6020-8-Ca2-L	Spares	NG	1,500.00
60.400.649	NAS1-6020-8-Ca3-L	Spares	NG	6,000.00
60.400.649	NAS1-6020-8-Ca4-L	Spares	NG	22,000.00
60.400.649	NAS1-6020-8-Ca6-L	Spares	NG	24,000.00
60.400.649	NAS1-6020-8-Ca7-L	Spares	NG	7,000.00
60.400.649	NAS1-6020-8-Ca8-L	Spares	NG	12,000.00
60.400.557	NAS1-6020-11-Ca9-L	Spares	NG	136.00
60.400.649	NAS1-6020-11-Ca11-L	Spares	NG	2,337.00
60.400.649	NAS1-6020-11-Ca12-L	Spares	NG	18,648.00
60.400.649	NAS1-6020-11-Ca13-L	Spares	NG	5,213.00
60.400.729	NAS1-6020-11-Ca13-L	Spares	NG	-1,225.00
60.400.729	NAS1-6020-11-Ca13-1-L	Spares	NG	-6,000.00
60.400.649	NAS1-6020-11-Ca14-L	Spares	NG	5,600.00
60.400.729	NAS1-6020-11-Ca14-L	Spares	NG	214.00
60.400.649	NAS1-6020-14-Ca17-L	Spares	NG	690.00
60.400.773	NAS1-6020-20-Ca52-L	Procurement of Misc. Spares	SH	1,700.00
60.400.773	NAS1-6020-20-Ca53-L	Procurement of Misc. Spares	SH	17,000.00
60.400.773	NAS1-6020-20-Ca55-L	Replacement Phil.React.Cont.Sys.	SH	4,225.00
60.400.557	NAS1-6020-L	Logistics Support	RB	13,219.00
60.400.931	NAS1-10000-M	Spares	PK	26,787.00
		TOTAL SPARES EXPENDITURES		$1,275,231.86

SHIPPING EXPENDITURES

L-84994	USNAD Shipping	PH	$ 540.80
NAS1-3493, -3698	Hercules Shipping	YEPF	95.93
NAS1-3698	Hercules Shipping	RBCPYEPRFRSGPH	20,504.89
NAS1-4664	LTV Shipping	YE	2,254.43
NAS1-4794-5	Aerojet Shipping	PH	144.00
NAS1-4794-9	Aerojet Shipping	YENGPH	3,809.60
NAS1-4794	Aerojet Shipping	PFH	7,387.20
NAS1-4795-2	Hercules Shipping	PG	153.60
NAS1-4795-3	Hercules Shipping	PF	2,592.00
NAS1-5610	LTV Shipping	RBG	889.60
NAS1-5883	LTV Shipping	RBYENPRGPFH	19,095.66
NAS1-6020	LTV Shipping	RBYEFNPRGPH	25,197.29
	TOTAL SHIPPING EXPENDITURES		$ 82,665.00

TABLE LXXII - PHASE IV SPECIALS EXPENDITURES (25 SCOUTS)

SPECIALS EXPENDITURES

NASA SPECIALS

MISSION MODS (01-04) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS		TOTAL
60.400.661	L-84996	Mods. to E-Sections 1 and 15	PG	$	1,080.00
01.030.046	L-88027-6	Payload Separation	PF		273.62
60.400.446	NAS1-3589-20(c49)	Rework and Retest E-Sect., S138R	PF		6,000.00
60.400.214	NAS1-3899-24	E-Sect. Adapter and Sep. Sys.	PE		17,216.00
60.400.367	NAS1-3899-36	Brackets, E-Section	PF		8,323.00
60.400.545	NAS1-3899-36-1	Marman Clamp Completion	PF		3,635.00
60.400.331	NAS1-3899-38	Flight E-Section, from T-24	SF		9,000.00
60.400.598	NAS1-3899-38-1	Mods. 2-Section Sep. Systems	SF		9,858.00
60.400.764	NAS1-3899-38-2	E-Section Suitcase Checkers	SH		1,048.00
60.400.962	NAS1-3899-38-3	Completion of Contract	PJ		964.00
60.400.199	NAS1-3899-38-4	Final Contract Price Adjustment	PM		384.00
60.400.334	NAS1-3899-40	3 E-Section Adapters	PF		54,692.00
60.400.763	NAS1-3899-44-1	4 E-Section Separation Systems	SH		522.00
60.400.962	NAS1-3899-44-2	Completion of Contract	PJ		79.00
60.400.584	NAS1-4664-10	Checkout E-Section	PF		1,985.00
60.400.569	NAS1-4664-15(c4)	Sandia/Whittaker Gyro Pkg., SM	PF		26,317.00
60.400.485	NAS1-5592-1	2 Timers for E-Section Completed	PF		2,285.00
60.400.544	NAS1-5592-1	2 Timers for E-Section	PF		11,090.00
60.400.620	NAS1-5592-8(c3)	Batteries for E-Section Timers	SF		12,366.00
60.400.649	NAS1-6020-8-Cal-L	E-Section Telemetry Batteries	SFH		5,260.08
60.400.752	NAS1-6935-11	6 Test and 6 Flt. E-Sect. Sep. Sys.	SH		65,000.00
60.400.808	NAS1-6935-11	4 Test E-Sections and 12 Timers	SH		90,144.00
60.400.888	NAS1-6935-15	Recertification of S-144CR	PI		34,640.00
60.900.003	NAS1-6935-33	Refurbishment of S-144CR	PHIJ		161,175.00
60.900.003	NAS1-6935-33	Diversion of Base A, S-144CR	PJ		-5,568.00
		MISSION MODS SUBTOTAL		$	517,768.70

SUPPORTING ACTIVITIES (02-00)

DCASO

P.R. NO.	ORDER NO.	ITEM	FUNDS		TOTAL
01.030.020	NAS1-553(487)	DOD Plant Services	SG	$	409.77
01.030.020	NAS1-585(479)	DOD Plant Services	PH		911.20
01.030.020	NAS1-900(275)	DOD Plant Services	PF		979.60
45.110.018	NAS1-1295(122)	DOD Plant Services	SF		139.32
01.030.020	NAS1-1295(271)	DOD Plant Services	PF		975.50
45.110.020	NAS1-1295	DOD Plant Services	PF		7,259.26
45.110.020	NAS1-1330	DOD Plant Services	PF		216.00
45.110.051	NAS1-1330(198)	DOD Plant Services	PG		0.40

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
DCASO Continued				
01.030.020	NAS1-1481(269)	DOD Plant Services	SF	$ 320.00
45.110.051	NAS1-1481(101)	DOD Plant Services	SF	160.00
45.110.051	NAS1-1928(103)	DOD Plant Services	SG	480.00
45.110.018	NAS1-1928(122)	DOD Plant Services	SF	97.53
01.030.020	NAS1-1928(219,267)	DOD Plant Services	SFH	2,370.00
45.110.018	NAS1-1928	DOD Plant Services	SF	6.80
45.110.020	NAS1-1928	DOD Plant Services	SF	1,999.16
01.030.020	NAS1-1970(276)	DOD Plant Services	PF	240.00
01.030.020	NAS1-2165(273,403)	DOD Plant Services	PFG	237.25
45.110.020	NAS1-2165	DOD Plant Services	PF	489.60
01.030.020	NAS1-2189(277)	DOD Plant Services	PF	320.00
01.030.020	NAS1-2215(278)	DOD Plant Services	SF	160.00
45.110.020	NAS1-2215(278)	DOD Plant Services	SF	80.00
01.030.020	NAS1-2455(279)	DOD Plant Services	SF	320.00
45.110.020	NAS1-2455	DOD Plant Services	SF	208.98
45.110.020	NAS1-2617	DOD Plant Services	SF	90.56
01.030.020	NAS1-2650(223)	DOD Plant Services	PF	1,165.75
45.110.018	NAS1-2650	DOD Plant Services	PDE	522.45
45.110.020	NAS1-2650	DOD Plant Services	PF	13,452.20
01.030.020	NAS1-3420(41,88)	DOD Plant Services	PF	4,671.32
45.110.020	NAS1-3420	DOD Plant Services	PF	6,693.84
01.030.020	NAS1-3493(168,191)	DOD Plant Services	PF	11,349.28
45.110.020	NAS1-3493	DOD Plant Services	PF	1,579.00
01.030.020	NAS1-3589(68,86,87)	DOD Plant Services	PSFSG	20,313.43
45.110.018	NAS1-3589	DOD Plant Services	SF	4,952.00
45.110.020	NAS1-3589	DOD Plant Services	PSF	38,747.38
45.110.051	NAS1-3615(36)	DOD Plant Services	PG	160.00
01.030.020	NAS1-3615(42,274)	DOD Plant Services	PSF	5,581.58
45.110.020	NAS1-3615	DOD Plant Services	SF	8,110.45
45.110.051	NAS1-3657(111)	DOD Plant Services	SF	160.00
01.030.020	NAS1-3657(229,272)	DOD Plant Services	SF	13,445.00
45.110.020	NAS1-3657(229)	DOD Plant Services	SF	7,735.78
45.110.020	NAS1-3657	DOD Plant Services	PF	24,855.72
01.030.020	NAS1-3664(170)	DOD Plant Services	PF	384.00
45.110.020	NAS1-3664(170)	DOD Plant Services	PF	76.50
01.030.020	NAS1-3683(230)	DOD Plant Services	SF	1,744.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
DCASO Continued				
01.030.020	NAS1-3698(171,190)	DOD Plant Services	PF	$ 32,548.98
45.110.020	NAS1-3698	DOD Plant Services	PF	33,032.79
01.030.020	NAS1-3833(172,328)	DOD Plant Services	PF	9,123.65
45.110.020	NAS1-3833	DOD Plant Services	PF	10,656.00
45.110.051	NAS1-3899(106,107)	DOD Plant Services	SF	784.00
01.030.020	NAS1-3899(157)	DOD Plant Services	PSF	22,626.61
45.110.018	NAS1-3899(158)	DOD Plant Services	SF	-305.20
01.030.020	NAS1-3899(158)	DOD Plant Services	SF	2,661.26
45.110.018	NAS1-3899	DOD Plant Services	SF	3,264.00
45.110.020	NAS1-3899	DOD Plant Services	SF	2,516.49
01.030.020	NAS1-4325(71,156)	DOD Plant Services	SF	2,572.00
45.110.051	NAS1-4325(109)	DOD Plant Services	SFH	216.00
45.110.018	NAS1-4325(122)	DOD Plant Services	SF	1,874.94
45.110.020	NAS1-4325	DOD Plant Services	SF	4,968.98
45.110.051	NAS1-4664(84,85)	DOD Plant Services	SFGPSH	68,276.00
45.110.020	NAS1-4664(85)	DOD Plant Services	SF	794.41
01.030.020	NAS1-4664(127)	DOD Plant Services	PF	100,000.00
01.030.020	NAS1-4794(177)	DOD Plant Services	SF	625.60
45.110.051	NAS1-4794(219,220)	DOD Plant Services	SFPG	848.00
01.030.020	NAS1-4795(176)	DOD Plant Services	SFG	9,127.84
45.110.051	NAS1-4795(221,222)	DOD Plant Services	SFPG	6,299.00
45.110.020	NAS1-4795	DOD Plant Services	SF	23.22
01.030.020	NAS1-5034(175)	DOD Plant Services	PF	29,053.34
45.110.051	NAS1-5592(96,97)	DOD Plant Services	SFGH	10,260.00
01.030.020	NAS1-5592(280,281)	DOD Plant Services	SF	976.00
01.030.020	NAS1-5610(390,430)	DOD Plant Services	PF	1,600.00
45.110.051	NAS1-5883(453,461)	DOD Plant Services	PFGH	3,055.32
01.030.020	NAS1-6076(487)	DOD Plant Services	SH	251.60
45.110.051	NAS1-6444(663)	DOD Plant Services	PG	96.00
45.110.051	NAS1-6935(620,621)	DOD Plant Services	SG	824.00
45.110.051	NAS1-7102(732)	DOD Plant Services	SH	136.00
01.030.020	NAS5-61(215)	DOD Plant Services	SF	30.62
45.110.020	NAS5-61	DOD Plant Services	SF	40.80
OSSA DIRECT	DCASO	DOD Plant Services	SH	36,000.00
OSSA DIRECT	DCASO	Half Costs Paid by Navy	SH	-18,000.00
		DCASO SUBTOTAL		$ 561,028.86

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIELD SERVICES (02-01) Continued				
LANGLEY RESEARCH CENTER				
62.510.222	L-7910	Wire	SG	$ 105.45
62.510.226	L-8176	Hydraulic Hose Equipment	SG	119.82
54.010.735	L-8576	Heater Elements	SG	154.52
12.720.846	L-10241	Replacement Items for HPTA Systems	SH	839.95
12.720.846	L-10242	Replacement Items for HPTA Systems	SH	157.00
12.720.846	L-10243	Replacement Items for HPTA Systems	SH	1,700.00
ADB100	L-15974	Stock Issues	SFGH	2,641.34
50.050.878	L-79872	Frames	SF	112.80
53.340.425	L-82028	Galvanized Wire	SF	54.29
50.050.929	L-83647	Painting Scout	SF	200.00
01.030.047	L-91040-26	Shipping Rings	PF	2,482.52
01.030.048	L-92234-9	Shipping Rings	PF	2,100.00
01.030.048	L-92234-10	Shipping Rings	PF	1,950.00
56.250.013	L-2156250013	Gears, Bearings, Screws, etc.	SH	76.18
60.400.249	NAS1-4781(61)	Static Firing, Algol IIB-23	SF	35.50
60.400.249	NAS1-4781	Preparing Display Vehicle	SF	35.50
	NAS1-6133	Rigging and Hauling	SH	115.20
60.400.931	NAS1-10000-P	Langley Support	PK	20,348.00
		LANGLEY RESEARCH CENTER SUBTOTAL		$ 33,228.07
WALLOPS STATION				
60.400.694	L-599	Diode	SG	$ 29.93
53.340.537	L-1208	Measuring Machine	SG	9.60
53.320.696	L-1975	Plate	SG	35.62
51.250.203	L-2004	Measuring Machine	SG	211.68
60.400.698	L-2500	Screws, FW-4S Motor Refurbishment	SG	78.05
51.250.207	L-2936	Measuring Machine	SG	21.14
	L-3172	Stock Issues	SH	2.75
53.330.824	L-3974	Measuring Machine	SG	16.36
53.340.555	L-4144	Measuring Machine	SG	357.35
53.320.744	L-7273	Connectors	SH	1,004.00
50.050.341	L-8750	Cleaning Shipping Containers	SH	164.00
60.400.743	L-11204	Slide Trays	SG	23.52
04.030.572	L-13577	Subscription-LRC	SH	25.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIELD SERVICES (02-01) Continued				
WALLOPS STATION Continued				
ADB100	L-15974	Stock Issues	PESPFSGH	$ 6,029.02
60.400.805	L-16792	Pak for Punching-Binding Machine	SH	30.00
53.520.261	L-19110	Crystal, Liquid	SF	74.73
53.520.184	L-19148	Binders, Loose Leaf	SG	267.25
53.520.335	L-19647	Lettering Systems	SF	57.02
60.400.849	L-22101	Connecting Aid, S-163 and Sub	SH	426.98
42.060.748	L-23592	Record-O-Phone for REMO	SH	545.00
60.400.593	L-44472	4-Station Switching Sys. Location	SFG	18,672.38
60.400.723	L-44472	4-Station Switching Sys. Location	SH	10,000.00
60.400.801	L-44472	Moving Datafax at Dallas	SH	350.00
60.400.802	L-44472	4-Station Switching Sys. Location	SH	6,654.44
60.400.441	L-61716	Gasoline	SF	4.20
60.400.501	L-61716	Temperature Gage Records	SF	47.50
01.030.026	L-71216-15	Algol Handling Rings	SF	2,500.00
01.030.024	L-71235-29	Orifice Plates	SF	99.50
60.400.444	L-73135	Paint for Blast Shield	SF	6.50
60.400.065	L-75307	Chartered Airplane	SF	38.00
53.320.414	L-75815	Chemical Coating, Battery Boxes	SF	38.80
60.400.483	L-75918	Hose, Stainless Steel	SF	294.46
60.400.488	L-77093	M.G. Set	SF	919.59
01.030.031	L-80285-6	Castor Clamps	SF	99.99
01.030.038	L-83189-8	Handling Rings	SF	400.00
53.320.557	L-84783	Multiple-Range Voltmeter	SF	349.00
53.510.990	L-85087-121	Cable	SG	24.40
01.030.052	L-96074-10	Tool Services	SG	230.00
01.030.060	L-98432-14	Measuring Machine	SG	258.70
50.050.768	L-98938	Measuring Machine	SG	233.24
01.030.063	L-4-54110-359	Tool Services	SG	480.00
53.520.247	80330180960-071	Perforator, Paper	SF	4.90
01.030.075	L-0853110139	Shroud Locking Tools	SH	129.35
53.320.757	L-3153320757	Diodes	SH	215.40
60.400.960	NAS1-3615-5	Completion of Contract	PJ	761.00
60.400.199	NAS1-3615-6	Final Contract Price Adjustment	PM	113.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIELD SERVICES (02-01) Continued				
WALLOPS STATION Continued				
60.400.199	NAS1-3899-22-1	Final Contract Price Adjustment	PM	$ 49.00
60.400.352	NAS1-3899-41	Mod. Kits, Transporter	SF	26,596.80
60.400.420	NAS1-3899-41	Mod. Kits, Transporter	SF	30,797.00
60.400.352	NAS1-3899-41-1	Mod. Kits, Transporter	SF	-607.00
20.200.579	NAS1-4664-3	Return Crew to Dallas (Reserve)	PF	114,000.00
60.400.199	NAS1-4664-5	FY66 Launch Services	PF	972,372.00
60.400.570	NAS1-4664-13	Scout Transporter Mods.	SF	6,000.00
60.400.588	NAS1-4664-13	Scout Transporter Mods.	SF	3,044.00
60.400.568	NAS1-4664-15	New GSE	SF	6,649.00
60.400.199	NAS1-4664-18	FY66 Launch Services	PF	-23,094.00
20.200.579	NAS1-4664-20	Return Crew to Dallas	PF	-79,086.00
20.200.579	NAS1-4664-23	Unused Return Crew Funds	PH	-10,998.00
60.400.199	NAS1-4664-K	Logistics Support	SF	330,938.00
60.400.625	NAS1-6020-2-J	Mod. Kits for Switching Relays	SG	6,287.00
60.400.557	NAS1-6020-3-M	Wallops Island Field Team	PK	600.00
20.200.579	NAS1-6020-5-M	Return Crew to Dallas	PF	79,086.00
60.400.557	NAS1-6020-9-M	FY67 Launch Services	PH	328,627.00
60.400.557	NAS1-6020-M	FY67 Launch Services	PFG	758,533.39
	NAS1-6133	Rigging and Hauling	SG	113.70
	Suballotment Wallops		SFGH	151,067.49
		WALLOPS STATION SUBTOTAL		$2,753,309.59
WESTERN TEST RANGE				
60.010.001	L-2558-468	WTR Small Purchases	SF	$ 66.54
60.010.002	L-2558-661	WTR Small Purchases	SF	18,627.40
53.330.058	L-15404	Grease Replacement	SH	17.79
ADB100	L-15974	Stock Issues	SH	673.29
51.250.503	L-16060	1 Motor, Machine Shop	SH	98.98
60.400.671	L-44472	Datafax Switch System	SG	2,335.49
50.050.948	L-61746-46	Heat Treat Rings	SF	135.91
53.110.482	L-73497	Steel, 8 Pieces	SF	2,302.29
60.400.494	L-78896	Cable	SF	729.60
60.400.528	L-79464	Voltmeter	SF	1,736.68
53.320.557	L-84783	Multiple-Range Voltmeter	SF	1,276.00

PHASE IV (25 SCOUTS)

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIELD SERVICES (02-01) Continued				
WESTERN TEST RANGE Continued				
60.400.613	L-90030	M.G. Set	SF	$ 983.00
01.030.074	L-0253110094	Spin Tables	SH	2,388.00
01.030.075	L-0253110252	Shroud Locking Tools	SH	1,189.02
01.030.078	L-0253110338	Spin Tables	SH	696.50
01.030.092	L-0352220876	Adapter Plate for Shaker Table	SH	360.00
53.340.638	L-1153340638	Ball Bearings	SH	882.00
20.200.608	NAS1-2617	WTR Emergency Support	SF	2,092.19
60.400.568	NAS1-4664-15	New GSE	SF	22,644.00
60.400.811	NAS1-4794-9-2	Tire Replacement, Algol Hand.Dol.	SH	1,100.00
20.200.717	NAS1-4795-1	3 X-258 Handling Fixtures	SF	2,128.00
60.400.676	NAS1-6020-2-N	AFWTR Training	SG	5,000.00
	NAS1-6133	Move Pump at QASS	SG	37.90
	NAS1-6133	Rigging and Hauling	SH	212.40
60.010.005	NAS1-8043	Dynamic Balancing Facility	SH	13,346.00
	Suballotment WTR		SFGH	108,926.62
	AF-04(695)-67-C-0038	50-Percent Support at VAFB FY67	NG	210,372.00
		WESTERN TEST RANGE SUBTOTAL		$ 400,357.60
PRODUCTION SUPPORT (02-02)				
60.400.720	L-4898	Velostat Film for FW-4S	SG	$ 117.67
ADB100	L-15974	Stock Issues	SGH	617.37
01.030.088	L-23082	Wind Tunnel Scout E Model	SH	537.40
56.250.006	L-24107	Fin Effectiveness Test Motor	SH	540.80
60.400.524	L-61716	Recording Thermometer	SF	46.54
55.310.198	L-65692	Scout Velocity Package	SF	6.09
60.400.377	L-68822	Air Transport Demonstration, S-131R	SF	4,481.00
60.400.450	L-74164	Air Transport of Vehicle S-139	SF	11,664.00
60.400 552	L-81206	Air Transport of S-145, S-146	SF	13,685.60
60.400.552	L-81206-1	Air Transport of S-145, S-146	SF	-7,000.00
60.400.574	L-83235	Stainless Steel	SF	60.76
60.400.559	L-84992	Radar Antenna, D-Section	SF	651.00
60.400.753	L-84999	X-259 Test at NORD	SG	15,000.00
60.400.586	L-85662	Captive Nut Hi-Shear Mod. S/N 7313-2	SF	1,694.25
60.400.587	L-85662	Hi-Shear No. PC33	SF	803.25

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02) Continued				
53.320.529	L-85763	Digital Voltmeter	SF	$ 1,180.00
54.010.009	L-86082	Stainless Steel Fitting	SF	34.25
53.340.476	L-89501	Scout Antenna Tests	SF	82.80
60.400.605	L-90295	Air Transport of S-150	SF	4,811.10
50.050.122	L-92207	Construct. Antenna Model Stand	SF	202.10
53.320.640	L-94090	Scout Ignition Battery Simulator	SG	87.49
53.320.652	L-95588	Diodes	SG	41.50
60.400.670	L-97465	Air Transport, S-155	SG	7,000.00
60.400.734	L-97465	Air Transport, Scout Vehicle	SG	9,065.00
01.030.069	L-0453120709	Guide Pin Set Assembly Fit Check	SH	875.00
01.030.078	L-0853110371	Spin Tables	SH	177.11
60.400.376	NAS1-1330-15	Tensile Test, Algol II Nozzle Insul.	SF	301.00
	NAS1-3515	Maintenance and GSE at LRC	SF	55,000.00
60.400.961	NAS1-3657-8	Completion of Contract	PSHPIJ	27,090.00
60.400.199	NAS1-3657-9	Final Contract Price Adjustment	PJ	11,175.00
60.400.199	NAS1-3899-16-1	Final Contract Cost Adjustment	PM	70.00
60.400.420	NAS1-3899-17-6	Final Contract Cost Adjustment	PM	164.00
60.400.535	NAS1-3899-34-2	Rev. Scout User's Manual	SF	1,012.00
60.400.962	NAS1-3899-34-3	Completion of Contract	PJ	596.00
60.400.199	NAS1-3899-34-4	Final Contract Cost Adjustment	PM	188.00
60.400.420	NAS1-3899-41-4	Final Contract Cost Adjustment	PM	741.00
60.400.418	NAS1-3899-42	Tests, EX-38 Cartridges	SF	1,500.00
60.400.470	NAS1-3899-42	Accept. Test, EX-38 Cartridges	SF	2,776.00
60.400.385	NAS1-3899-46	Central Ordnance Complex Study	SF	30,000.00
60.400.498	NAS1-3899-46	Central Ordnance Study	SF	9,436.00
60.400.045	NAS1-4437	Castor I Flight Nozzles	SF	32.52
60.400.199	NAS1-4664-5-E	Support Services for Phase IV	SF	795,622.32
60.400.438	NAS1-4664-6	E-Section Instrumentation	SF	90,764.00
60.400.556	NAS1-4664-12-H	Scout Standard Operating Procedures	SF	23,751.00
60.400.199	NAS1-4664-E	Support Services for Phase IV	SF	39,415.40
60.400.399	NAS1-4793-2	Thiokol Sup. for Castor II Load Test	SF	2,141.00
60.400.477	NAS1-4793-3	Repair Castor Shipping Containers	SF	1,628.00
60.400.497	NAS1-4793-5	Leak Flow Anal., Castor II Nozzle	SF	5,000.00
60.400.525	NAS1-4793-5	Castor II Nozzle Flow Analysis	SF	1,000.00
60.400.551	NAS1-4793-5	Castor II Nozzle Flow Analysis	SF	1,128.00
60.400.509	NAS1-4794-5	Algol II Sustaining Engineering	SF	13,304.78
60.400.475	NAS1-4795-2	HPC Sustaining Engineering	SF	62,329.00
60.400.719	NAS1-4795-2-3	Final Overhead Title Rates Adjust.	SH	5,061.00
60.400.397	NAS1-4795-4	Installation of Tunnel Tabs	SF	3,827.00
60.400.403	NAS1-4795-5	X-258 and X-259 Dwg. & Doc. Review	SF	9,000.00
60.400.495	NAS1-4795-5	X-258 Drawing & Document Review	SF	4,863.00
60.400.476	NAS1-5034-2(c3)	Castor IIA Noz. Entrance Insulator	SF	630.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02) Continued				
60.400.596	NAS1-5592-1	Lightweight Beacon Study	SF	$ 8,543.00
60.400.561	NAS1-5592-3	C/D Receiver and T/M Transmitter	SF	40,000.00
60.400.614	NAS1-5592-3	C/D Receiver and T/M Transmitter	SF	7,012.00
60.400.445	NAS1-5592-4	Vehicle Vertical Alinement	SF	-42,934.00
60.400.561	NAS1-5592-10	Receiver and Transmitter	SG	-10,918.00
60.400.780	NAS1-5592-13	Overrun	SH	22,783.00
60.400.445	NAS1-5592	R and D Product Improvement	SF	250,000.00
60.400.499	NAS1-5592	R and D Product Improvement	SF	116,926.00
60.400.693	NAS1-6020-2-J	Deutsch Connectors	SG	4,476.00
60.400.691	NAS1-6020-2-N	Optical Equipment	SG	1,239.00
60.400.557	NAS1-6020-3-A	Prime Contractor Management	SFG	79,111.90
60.400.557	NAS1-6020-3-F	Reliability	SG	55,952.60
60.400.703	NAS1-6020-4-H	Autodestruct Rework to EGSE and MGSE	SG	8,667.00
60.400.702	NAS1-6020-6(c1)-G	Rev. Standard Procedures	SG	1,132.00
60.400.704	NAS1-6020-6(c2)-H	Modification to EGSE	SF	4,816.00
60.400.557	NAS1-6020-7-E	Systems Engineering	SH	40,642.28
60.400.740	NAS1-6020-7-E	X-258 Motor System Engineering	SG	51,572.72
60.400.557	NAS1-6020-9-A	Prime Contractor Management	SH	36,657.19
60.400.557	NAS1-6020-9-C	Preflight Planning	PH	5,936.39
60.400.557	NAS1-6020-9-E	Systems Engineering	SH	250,000.00
60.400.557	NAS1-6020-9-F	Reliability	PSH	375,579.08
60.400.557	NAS1-6020-9-G	Standardization	PH	170,153.26
60.400.557	NAS1-6020-9-L	Logistics	SH	2,604.00
60.400.750	NAS1-6020-10-E	Qual. Control Rep.at UTC(FW4S Vend)	SGH	28,800.00
60.400.789	NAS1-6020-15-Ca32-R	Replacement, Scout Veh. Comp.	SH	18,497.00
60.400.675	NAS1-6020-16-Ca18-S	Emergency Propulsion Sys. Sup.	SH	4,500.00
60.400.675	NAS1-6020-16-Ca20-S	Prep. Algol IIB, S/N17, for Ship.	SH	1,000.00
60.400.675	NAS1-6020-16-Ca21-S	Qual. Test, X-258-E6, RH-130	SH	25,000.00
60.400.675	NAS1-6020-16-Ca23-S	Initiator Development Program	SH	12,000.00
60.400.675	NAS1-6020-16-Ca30-S	Emergency Propulsion Sys. Support	SH	1,000.00
60.400.773	NAS1-6020-16-Ca31-S	Replacing Algol II Nozzle on S-157	SH	3,325.00
60.400.675	NAS1-6020-16-Ca35-S	Machining of X-259 Nozzles	SH	7,500.00
60.400.675	NAS1-6020-16-Ca38-S	Explosive Bolts, Ext. Shelf Life	SH	330.00
60.400.675	NAS1-6020-16-Ca39-S	Rework Castor IIA Motor Tool	SH	2,110.00
60.400.744	NAS1-6020-17(cr)-G	Handling Proceds. for Mtr Contnrs.	SF	2,400.00
60.400 799	NAS1-6020-17(c4)-G	Handling Proceds. for Mtr Contnrs.	SF	9,134.00
60.400.784	NAS1-6020-17-Ca28-R	Repair Base A Section, S-157	SF	4,283.00
60.400.773	NAS1-6020-19-Ca36-S	Preparation of X259 Chamb. to Ship	SH	700.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02) Continued				
60.400.675	NAS1-6020-19-Ca37-S	X-258 Aging Program	SH	$ 5,473.00
60.400.773	NAS1-6020-19-Ca37-S	X-258 Aging Program	SH	26,940.00
60.400.773	NAS1-6020-19-Ca41-S	Fourth-Stage Initiators	SF	4,600.00
60.400.773	NAS1-6020-19-Ca45-S	9 Batch Test Motors	SH	3,600.00
60.400.773	NAS1-6020-19-Ca47-S	Instrumentation, FW-4S Rkt.Mtrs.	SH	13,200.00
60.400.773	NAS1-6020-19-Ca49-S	Rework Algol IIB-55 Igniter Sleeve	SH	2,350.00
60.400.773	NAS1-6020-19-Ca56-S	Fab. Aft Insul. Mold, X-259 Mtr.	SH	12,000.00
60.400.773	NAS1-6020-19-Ca57-S	X-ray of Castor Nozzle	SH	1,100.00
60.400.773	NAS1-6020-20-Ca55-L	Repl. Philosophy for Reac.Cont.Sys.	SF	4,575.00
60.400.815	NAS1-6020-24(c7)-K	Instrumentation for S-161	SH	16,500.00
60.400.860	NAS1-6020-29(M23)-K	Ext. Shelf Life EX-38 Cartridges	SH	1,486.15
60.400.557	NAS1-6020-A	Prime Contractor Management	SFG	505,527.91
60.400.557	NAS1-6020-B	Payload	SFPI	69,053.00
60.400.557	NAS1-6020-C	Preflight Planning	SG	85,362.61
60.400.557	NAS1-6020-D	Data Analysis	SFG	239,584.00
60.400.557	NAS1-6020-E	Systems Engineering	SFG	487,740.50
60.400.714	NAS1-6020-E	Systems Engineering	SH	63,840.22
60.400.740	NAS1-6020-E	Systems Engineering	SH	31,253.28
60.400.557	NAS1-6020-F	Reliability	SFG	35,276.32
60.400.740	NAS1-6020-F	Reliability	SH	9,389.00
60.400.557	NAS1-6020-G	Standardization	SFG	124,059.74
60.400.557	NAS1-6020-J	Vehicle Mod. Checkout	SG	88,196.39
60.400.557	NAS1-6020-L	Logistics	SG	121,590.00
60.400.557	NAS1-6020-P	LTV-LRC Field Support	SG	111,534.00
	NAS1-6133	Rigging and Hauling	SG	75.80
60.400.696	NAS1-6935-2	Shock Spectrum Plots	SG	3,300.00
60.400.931	NAS1-10000-R-2	S-144 PAET Reentry	PK	68,933.00
60.400.931	NAS1-10000-17-E	Systems Engineering	PL	124,650.00
60.400.931	NAS1-10000-17-K	Certification Training	PL	1,112.00
60.400.931	NAS1-10000-30-R-2	S-144 PAET Reentry	PL	2,072.00
66.000.029	NAS1-10000-30-R	Special Programs	PL	13,873.00
60.400.931	NAS1-10000-A	Program Management	PK	139,126.00
60.400.931	NAS1-10000-B	Payload Coordination	PK	21,681.00
60.400.931	NAS1-10000-C	Preflight Planning	PK	23,928.00
60.400.931	NAS1-10000-D	Data Reduction and Analysis	PK	44,150.00
60.400.931	NAS1-10000-F	Reliability Program	PK	69,055.00
60.400.931	NAS1-10000-G	Standardization & Config. Cont.	PK	27,584.00
60.400.931	NAS1-10000-K	Certification Training	PK	19.00
		PRODUCTION SUPPORT SUBTOTAL		$5,470,328.44
LOGISTICS (02-03)				
60.400.931	NAS1-10000-L	Logistics Support Management	PK	$ 28,988.00
		LOGISTICS SUBTOTAL		$ 28,988.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
SHIPPING				
	NAS1-3493	Hercules Shipping	SH	$ 15.65
	NAS1-3698	Hercules Shipping	SFH	44.17
	NAS1-4325	LTV Shipping	SH	670.34
	NAS1-5592	LTV Shipping	SH	11.45
	NAS1-5610	LTV Shipping	SH	6,334.00
	NAS1-5880	LTV Shipping	SH	637.50
	NAS1-5883	LTV Shipping	SH	3,388.11
	NAS1-6020	LTV Shipping	SGH	12,560.00
	NAS1-6935	LTV Shipping	SH	6.15
	NAS1-8043	Gisholt Shipping	SH	6.05
		SHIPPING SUBTOTAL		$ 23,673.42
		SUPPORTING ACTIVITIES SUBTOTAL		$9,270,913.98
PRODUCT IMPROVEMENT (03-00)				
ALGOL NOZZLE & FAILURE INVESTIGATION				
60.400.557	NAS1-6020-12-E	Incentive Penalty for S-152C	SH	$ -375,000.00
60.400.747	NAS1-6020-13-CA16-R	X-259 Tests, S-152C	SH	11,542.00
60.400.675	NAS1-6020-16-Ca34-S	Rework Algol IIB, SN55, S-160C	SH	2,500.00
60.400.557	NAS1-6020-27-E	Incentive Penalty for S-160	NG	-375,000.00
60.400.821	NAS1-6020-30-Ca51-R	S-160C Flt. Anomaly Investigation	SH	107,838.00
60.400.823	NAS1-6020-30-Ca51-R	S-160C Flt.Anom.Therm.&Stress Anal.	SH	30,000.00
60.400.828	NAS1-6020-30-Ca51-R	S-160C Flt.Anom.Invest.,Ext.Insul.	SH	26,000.00
60.400.835	NAS1-6020-30-Ca51-R	Algol IIB X-ray & Mod. Program	SFH	105,000.00
60.400.836	NAS1-6020-30-Ca51-R	Dissection of Algol IIB Nozzles	SH	20,000.00
60.400.840	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Mods., S-160	PFGH	45,000.00
60.400.845	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Insert	SFPI	2,031.75
60.400.848	NAS1-6020-30-Ca51-R	S-160 Algol Nozzle Investigation	PH	100,000.00
60.400.854	NAS1-6020-30-Ca51-R	S-160 Algol Nozzle Investigation	PI	98,114.00
60.400.863	NAS1-6020-30-Ca51-R	Dissection of Algol IIB Motor	PI	8,500.00
60.400.864	NAS1-6020-30-Ca51-R	Dissection of Algol IIB Motor	PI	9,500.00
60.400.866	NAS1-6020-30-Ca51-R	S-160 Algol Nozzle Investigation	PI	88,303.00
60.400.884	NAS1-6020-30-Ca51-R	Eval. Prod. & Handling Graphite	PI	30,342.25
60.400.773	NAS1-6020-35-Ca61-S	Differential Extract. of Radiographs	SHPI	2,490.00
60.400.861	NAS1-6935-25	Radiography Algol IIB Nozz. Insert	PI	6,000.00
60.400.922	NAS1-6935-25	Radiography Algol IIB Nozz. Insert	PI	5,950.00
		ALGOL NOZZLE SUBTOTAL		$ -50,889.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NASA SPECIALS Continued

PRODUCT IMPROVEMENT (03-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
34-INCH HEAT SHIELD				
60.400.644	NAS1-5592-9	34-Inch Heat Shield	SG	$ 3,430.00
		34-INCH HEAT SHIELD SUBTOTAL		$ 3,430.00
42-INCH HEAT SHIELD				
66.000.024	NAS1-6935-41-7(5)	Add. of Door for 42-inch Heat Shield	PK	$ 3,254.00
		42-INCH HEAT SHIELD SUBTOTAL		$ 3,254.00
SHIPPING				
	NAS1-6020	LTV Shipping	PI	$ 30.00
		SHIPPING SUBTOTAL		$ 30.00
		PRODUCT IMPROVEMENT SUBTOTAL		$ -44,175.00
		NASA SPECIALS SUBTOTAL		$9,744,507.68
		NAVY SPECIALS		
MISSION MODS (01-04)				
		Travel(63-29, 66-95)	YCNG	$ 76,169.96
		MISSION MODS SUBTOTAL		$ 76,169.96
SUPPORTING ACTIVITIES (02-00)				
DCASO				
01.030.050	NAS1-1295(283,284)	DOD Plant Services	YF	$ 320.00
01.030.050	NAS1-1330(198)	DOD Plant Services	NG	204.00
45.110.018	NAS1-3493	DOD Plant Services	YE	8,434.28
01.030.050	NAS1-3833(212,213)	DOD Plant Services	NG	250.80
01.030.020	NAS1-4664(127)	DOD Plant Services	NG	28,090.99
01.030.022	NAS1-4664(126,127)	DOD Plant Services	YE	25,134.40

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NAVY SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
DCASO Continued				
01.030.050	NAS1-4664(84,85)	DOD Plant Services	NGYE	$ 17,528.00
01.030.050	NAS1-5034(223,224)	DOD Plant Services	YENG	928.00
01.030.050	NAS1-5883(453)	DOD Plant Services	YE	2,928.00
01.030.050	NAS1-6020(580)	DOD Plant Services	NG	49,112.00
DIRECT DCASO		Half Costs Paid By Navy	SH	18,000.00
		DCASO SUBJECT		$ 150,930.47
FIELD SERVICES (02-01)				
WESTERN TEST RANGE				
60.400.557	NAS1-6020-N	AFWTR Field Team	NG	$ 533,957.00
60.400.557	NAS1-6020-2-N	AFWTR Field Effort Transfer to AF	NG	-529,141.00
		WESTERN TEST RANGE SUBTOTAL		$ 4,816.00
PRODUCTION SUPPORT (02-02)				
60.400.199	NAS1-4664-E	Support Services for Phase IV	NG	$2,807,159.81
60.400.557	NAS1-6020-2-A	Prime Contractor Management	NG	-3,824.00
60.400.557	NAS1-6020-3-A	Prime Contractor Management	NG	551.27
60.400.664	NAS1-6020-3-A	Prime Contractor Management	NG	61,039.50
60.400.664	NAS1-6020-3-B	Payload	NBYEF	19,316.19
60.400.650	NAS1-6020-3-C	Preflight Planning	NG	50,947.00
60.400.557	NAS1-6020-3-D	Data Analysis	NG	7,233.00
60.400.650	NAS1-6020-3-D	Data Analysis	NG	65,777.49
60.400.557	NAS1-6020-3-E	Wallops Field Team	NG	375,000.00
60.400.650	NAS1-6020-3-E	Systems Engineering	NG	360,715.44
60.400.664	NAS1-6020-3-E	Systems Engineering	YE	60,000.00
60.400.650	NAS1-6020-3-F	Reliability	YFNG	49,302.76
60.400.664	NAS1-6020-3-G	Standardization	YC	6,137.31
60.400.557	NAS1-6020-5-A	Prime Contractor Management	NG	403,393.71
60.400.702	NAS1-6020-6(c1)-G	Revision Standard Procedures	NG	10,000.00
60.400.704	NAS1-6020-6(c2)-A	Prime Contractor Management	NG	15,230.00
60.400.650	NAS1-6020-9-E	Systems Engineering	NG	40,642.28
60.400.776	NAS1-6020-15(c5)-A	Prime Contractor Management	NG	7,690.00
60.400.781	NAS1-6020-15-Ca22-R	Repair Base A, S-158C	YE	1,329.00

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NAVY SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02) Continued				
60.400.789	NAS1-6020-15(c32)-R	Replacement Scout Veh. Comps.	NG	$ 35,000.00
60.400.675	NAS1-6020-16-Ca38-S	Explosive Bolts, Shelf Life Ext.	NH	-12.00
60.400.773	NAS1-6020-19-Ca48-S	Extens. Shelf Life,Castor Initia.	NG	736.00
60.400.844	NAS1-6020-29(M21)-A	Prime Contractor Management	YC	110.00
60.400.860	NAS1-6020-29(M23)-A	Prime Contractor Management	YC	376.44
60.400.557	NAS1 6020-33-A	Termination	NG	-48,028.00
60.400.557	NAS1-6020-33-D	Termination	NG	-150,178.00
60.400.557	NAS1-6020-33-E	Termination	NG	-22,629.00
60.400.557	NAS1-6020-33-F	Termination	NG	-5,774.00
60.400.557	NAS1-6020-33-G	Systems Engineering	NG	-22,025.00
60.400.557	NAS1-6020-A	Prime Contractor Management	NAYFNG	209,597.35
60.400.557	NAS1-6020-B	Payload	YF	28,033.81
60.400.557	NAS1-6020-C	Preflight Planning	YF	11,644.00
60.400.557	NAS1-6020-D	Data Analysis	YF	241,453.51
60.400.557	NAS1-6020-E	Systems Engineering	YCEPNG	333,196.28
60.400.557	NAS1-6020-F	Reliability	YEFNG	281,351.02
60.400.650	NAS1-6020-F	Reliability	NG	1,655.22
60.400.557	NAS1-6020-G	Standardization	YCNG	216,318.69
60.400.557	NAS1-6020-P	LTV-LRC Field Support	YCF	185,089.00
		PRODUCTION SUPPORT SUBTOTAL		$ 5,633,556.08
LOGISTICS (02-03)				
60.400.729	NAS1-6020-20-Ca42-L	Logistics Support	NG	$ 68,500.00
60.400.729	NAS1-6020-20-Ca44-L	Logistics Support	NG	10,000.00
60.400.729	NAS1-6020-20-Ca46-L	Logistics Support	NG	1,900.00
60.400.729	NAS1-6020-20-Ca50-L	Logistics Support	NG	5,000.00
		LOGISTICS SUBTOTAL		$ 85,400.00
		SUPPORTING ACTIVITIES SUBTOTAL		$ 5,874,702.55

TABLE LXXII Continued - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

NAVY SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

PRODUCT IMPROVEMENT (03-00)

ALGOL NOZZLE AND FAILURE INVESTIGATION

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.854	NAS1-6020-30-Ca51-R	S160C Algol Nozzle Investigation	YE	$ 3,182.00
60.400.866	NAS1-6020-30-Ca51-R	S160C Algol Nozzle Investigation	NG	13,697.00
60.900.108	NAS1-6020-39-E	Incentive Refund, S160C	NG	250,000.00
		ALGOL NOZZLE SUBTOTAL		$ 266,879.00
		PRODUCT IMPROVEMENT SUBTOTAL		$ 266,879.00
		NAVY SPECIALS SUBTOTAL		$ 6,217,751.51

AIR FORCE SPECIALS

MISSIONS MODS (01-04)

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
	L-61717	LRC Packing and Handling Charges	RG	$ 118.00
60.400.485	NAS1-5592-1	6 E-Section Sep. Sys. - A.F.	RF	157,715.00
		Travel (62-6)	RBCG	83,778.92
		MISSIONS MODS SUBTOTAL		$ 241,611.92

SHIPPING

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
	NAS1-6020	LTV Shipping	RG	$ 21.72
		SHIPPING SUBTOTAL		$ 21.72

SUPPORTING ACTIVITIES (02-00)

DCASO

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
01.030.050	NAS1-2650(540)	DOD Plant Services	RF	$ 200.00
45.110.051	NAS1-2650(540)	DOD Plant Services	RG	488.00
01.030.050	NAS1-3420(391,392)	DOD Plant Services	RBFG	432.00
01.030.050	NAS1-3493(204,205)	DOD Plant Services	RF	1,475.00
01.030.050	NAS1-3589(98,99)	DOD Plant Services	RF	1,172.00
45.110.018	NAS1-3589	DOD Plant Services	RB	1,650.94

TABLE LXXII Concluded - PHASE IV SPECIALS EXPENDITURES

SPECIALS EXPENDITURES Continued

AIR FORCE SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
DCASO Continued				
01.030.050	NAS1-3664(208)	DOD Plant Services	RF	$ 384.00
01.030.022	NAS1-3899(158)	DOD Plant Services	RE	1,000.00
01.030.050	NAS1-4664(84,85)	DOD Plant Services	RBFG	23,024.00
01.030.050	NAS1-5034(223)	DOD Plant Services	RBG	2,032.00
01.030.050	NAS1-5883(453)	DOD Plant Services	RF	17,524.68
45.110.051	NAS1-5883(453)	DOD Plant Services	RFG	8,100.20
01.030.050	NAS1-6020(579)	DOD Plant Services	RF	112.00
01.030.050	NAS5-61(560)	DOD Plant Services	RF	56.22
		DCASO SUBTOTAL		$ 57,651.04
PRODUCTION SUPPORT (02-02)				
60.400.557	NAS1-6020-3-F	Reliability	RG	$ 64,765.00
60.400.557	NAS1-6020-9-G	Standardization	RBFG	64,867.54
60.400.557	NAS1-6020-B	Payload	RF	33,540.00
60.400.557	NAS1-6020-C	Preflight Planning	RE	44,336.00
60.400.557	NAS1-6020-D	Data Analysis	RDF	116,370.00
60.400.557	NAS1-6020-E	Systems Engineering	REF	281,156.00
60.400.557	NAS1-6020-F	Reliability	RF	166,530.00
60.400.557	NAS1-6020-G	Standardization	RCD	84,187.46
		PRODUCTION SUPPORT SUBTOTAL		$ 855,752.00
		SUPPORTING ACTIVITIES SUBTOTAL		$ 913,403.04
PRODUCT IMPROVEMENT (03-00)				
ALGOL NOZZLE AND FAILURE INVESTIGATION				
60.400.854	NAS1-6020-30-Ca51-R	S160C Algol Nozz. Investigation	RD	$ 13,754.00
		ALGOL NOZZLE & FAILURE INVESTIGATION		$ 13,754.00
		PRODUCT IMPROVEMENT SUBTOTAL		$ 13,754.00
		AIR FORCE SPECIALS SUBTOTAL		$ 1,168,790.68
		TOTAL SPECIALS EXPENDITURES		$17,200,973.87

NASA/DOD SCOUT - PROCUREMENT

TABLE LXXIII - PHASE V (15 VEHICLES) FINAL COST SUMMARY

Allocation of Funds

Vehicles (01-01)	$10,830,475.31
Motors (01-02)	6,206,785.18
First Stage	(2,315,647.49)
Second Stage	(1,690,489.00)
Third Stage	(1,150,973.84)
Fourth Stage	(1,049,674.85)
Others	819,763.47
Spares (01-03)	(687,655.90)
Shipping (01)	(132,107.57)
(01) TOTAL (15 Scouts, not including Mission Mods)	$17,857,023.96
HARDWARE COST PER SCOUT (1/15)	$1,190,468.26

	NASA (13)	NAVY (1)*	ESRO (1)	TOTAL (15)
Vehicle Hardware (01-00)	$15,476,088	$1,190,468	$1,190,468	$17,857,024
Mission Mods (01-04)#	941,715	181,286	8,544	1,131,545
Supporting Activities (02-00)**#	17,189,237	1,212,523	1,306,168	19,707,928
Product Improvement (03-00)#	1,625,449	48,280	0	1,673,729
TOTAL (15 SCOUTS)	$35,232,489	$2,632,557	$2,505,180	$40,370,226
Estimated Cost per Vehicle	$2,710,240	$2,632,607	$2,505,180	
VEHICLES ASSIGNED	163,164,165, 166,167,168, 169,170,171, 173,174,175, 177	176	172	

*Will be readjusted with Phase VI when firmer schedules are available.
**Includes DCASO and Logistics.
#Includes Shipping.

TABLE LXXIV - PHASE V PROGRAM EXPENDITURES (15 VEHICLES)

-01 HARDWARE

VEHICLE EXPENDITURES (01-01)

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
ADB100	L-15974	Stock Issues	NGPJ	$ 325.62
52.220.649	L0352220649	Shipping Rings	PI	1,850.00
60.400.957	NAS1-1928-15-1	Overrun	YC	733.00
60.400.443	NAS1-5610	15 Scout Vehicles	YCSEPFGJ	5,190,027.00
60.400.443	NAS1-5610	Transition C Structure	PF	18,350.00
60.400.443	NAS1-5610	Transition Lower D Structure	PF	6,650.00
60.400.443	NAS1-5610	Heat Shield	PF	16,500.00
60.400.443	NAS1-5610-1	Procurement of Scout Vehicles	PG	-1,000,000.00
60.400.443	NAS1-5610-2	Scout Vehicles	EPJ	989,533.17
60.400.621	NAS1-5610-2	Scout Vehicles	PSENGPHIEPJ	2,023,931.62
60.400.677	NAS1-5610-3	Autodestruct System	NG	4,131.83
60.400.443	NAS1-5610-4	Procurement of Scout Vehicles	PG	-5,100.00
60.400.759	NAS1-5610-7	Heat Shield and D-Section Mods.	PH	38,750.00
60.400.760	NAS1-5610-7	Repl. Alum. Tubes w/Stain. Steel	PH	6,510.00
60.400.656	NAS1-5610-7(c3)	Convert to Stainless Steel Tubes	SG	2,266.00
60.400.724	NAS1-5610-7(c10)	Scout Vehicles	NG	6,946.00
60.400.795	NAS1-5610-9(c15)	Temp. Meas., S-170 and Sub.	NG	1,000.00
60.400.832	NAS1-5610-9(c15)	Temp. Meas., S-170 and Sub.	PF	2,300.00
60.400.557	NAS1-6020-3-K	Vehicle Checkout	NG	165,497.12
60.400.650	NAS1-6020-3-K	Vehicle Checkout	NG	297,010.81
60.400.664	NAS1-6020-3-K	Vehicle Mod. Checkout	NG	3,767.00
60.400.557	NAS1-6020-5-H	Support to Vehicle Checkout	NGPIK	55,728.29
60.400.557	NAS1-6020-5-K	Vehicle Checkout	NG	52,482.00
60.400.649	NAS1-6020-8-Ca7-L	Spin Motors	NG	23,000.00
60.400.557	NAS1-6020-9-H	Support to Vehicle Checkout	PH	50,278.71
60.400.557	NAS1-6020-9-J	Vehicle Mod. Checkout	PH	16,941.50
60.400.557	NAS1-6020-9-K	Vehicle Checkout	PH	168,217.07
60.400.736	NAS1-6020-10-K	Cork Instl. Base A Fins,S-163-174	PG	6,310.00
60.400.649	NAS1-6020-11-Ca9-L	Explosive Bolts	NG	29,000.00
60.400.738	NAS1-6020-13-K	Mods., Body Bend.Fltrs.,S-160-162	NGPH	20,000.00
60.400.787	NAS1-6020-13-K	Mods., Body Bend.Fltrs.,S-160-162	NG	6,800.00
60.400.557	NAS1-6020-33-K	Termination of 5 Vehicles	NG	-543,332.00
60.400.557	NAS1-6020-33-T	Termination	NG	-3,443.00
60.400.557	NAS1-6020-J	Vehicle Mod. Checkout	SG	29,320.40
60.400.892	NAS1-6935-16	Mods. to Veh. & GSE for New D-Sect.	PI	10,837.00
60.900.039	NAS1-6935-44	Fourth-Stage S-Band Instrumentation	NG	98,687.00
60.400.911	NAS1-7256-5-H	Modifications to D-Section	EPJ	8,700.00
60.400.918	NAS1-7256-5-T	Fab. 6 Winterization Kits	PJ	1,381.80
60.400.902	NAS1-7256-14-Ca5-S	Retest S-169 Guidance System	PJ	8,858.00
60.400.902	NAS1-7256-14-Ca6-S	Mods. S-166 D-Sect. Reassign.S-'75	PJ	7,819.00
60.400.790	NAS1-7256-18-H	Support Vehicle Processing	NG	28,800.00
60.400.790	NAS1-7256-18-J	Vehicle Processing	EPJ	929,670.04
60.400.790	NAS1-7256-18-T	Vehicle Processing Hardware	NGEPJ	144,274.20

TABLE LXXIV Continued - PHASE V PROGRAM EXPENDITURES

-01 HARDWARE Continued

VEHICLES EXPENDITURES (01-01) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.790	NAS1-7256-18-V	Tooling	NGEPJ	$ 363,364.91
60.400.790	NAS1-7256-18(M1)-J	S-166 D-Section	PJ	8,700.00
60.400.923	NAS1-7256-18(M3)-H	Install Cork to Base-A Fins	PJ	3,010.00
60.900.017	NAS1-7256-18(M10)-H	D-Section Modifications	PJ	31,700.00
60.900.020	NAS1-7256-18(M12)-T	Heat Shield Modifications	EPJ	7,038.00
60.400.902	NAS1-7256-20-Ca15-S	Proc. 10 Scout Base-A Jet Vanes	PJ	19,600.00
60.900.023	NAS1-7256-20-Ca18-S	Rework Heat Shields, S/N A59 & A401	PJ	2,195.00
60.900.068	NAS1-7256-22-V	Fab. Master Drill Tools	PK	3,284.00
60.900.076	NAS1-7256-22-V	Vehicle Casting Patterns	EJ	2,779.00
60.900.078	NAS1-7256-22-V	Replace GSE Servo. Analyzers	PK	21,346.00
60.900.139	NAS1-7256-26-V	Tooling	EJPK	1,778.00
60.900.101	NAS1-7256-33-Ca36-S	Proc. Long Lead Time Comp.,S-144CR	PJ	6,388.00
60.400.790	NAS1-7256-35-H	Support to Vehicle Processing	PJ	15,657.00
60.400.790	NAS1-7256-35-J	Vehicle Processing	PJ	-3,684.00
60.400.790	NAS1-7256-H	Support to Vehicle Processing	PI	202,000.00
60.400.881	NAS1-7256-H	Support to Vehicle Processing	EJ	12,665.10
60.400.790	NAS1-7256-J	Vehicle Processing	PI	736,000.00
60.400.790	NAS1-7256-T	9 3-ft. Payload Umbilicals	PI	8,325.00
60.400.790	NAS1-7256-T	13 Finished Heat Shields	PI	92,800.00
60.400.790	NAS1-7256-T	12 Winterization Kits	PI	3,058.00
60.400.790	NAS1-7256-T	56 Spin Motors Reworked	PI	4,394.00
60.400.790	NAS1-7256-T	9 Base A Corks, S-166, S-170-S-177	PI	8,601.00
60.400.790	NAS1-7256-T	Special Investigation Modifications	PI	166,885.12
66.000.013	NAS1-10000-9-Ca14-S	Mod. A-63 Heat Shield	PK	532.00
60.400.931	NAS1-10000-17-V	Tooling and GSE Maintenance	PK	57,914.00
60.000.055	NAS1-10000-19-Ca9-S	Reprocessing Vehicle S-170	PK	130,000.00
60.400.931	NAS1-10000-H	Vehicle Processing	PK	2,836.00
		TOTAL VEHICLE EXPENDITURES		$10,830,475.31

MOTORS EXPENDITURES (01-02)

FIRST STAGE

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.900.102	L-52075	Destruct.Algol Nozz., Holex Squibs	NH	$ 414.46
60.400.659	NAS1-5610-4(c2)	Algol Initiators	NG	6,500.00
60.400.679	NAS1-5610-9(c4)	Prtctv. Pkg. Algol IIB Ret. Assy.	NG	1,000.00
60.400.830	NAS1-5610-9(c4)	Algol IIB Squib Ret. Assy. Pkg.	PF	4,600.00
60.400.890	NAS1-5610-13	Storage Algol IIB, Aerojet	PI	3,205.00
60.400.914	NAS1-5610-16	Algol Motor	PH	32.03
60.400.443	NAS1-5610	4 Algol Igniter Assemblies	PF	3,340.00
60.400.443	NAS1-5610	2 Algol Squib Retainers	PF	352.00

TABLE LXXIV Continued - PHASE V PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTORS EXPENDITURES (01-02) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIRST STAGE Continued				
60.400.443	NAS1-5610	2 Algol Nozz. Leak Check Toolings	PF	$ 1,490.00
60.400.443	NAS1-5610	14 Algol Rocket Motors (1 Q.A.)	SENPG	1,590,916.00
60.400.443	NAS1-5610	3 Algol Nozzle Assemblies	PG	52,140.00
60.900.048	NAS1-6935-40	Algol IIB Nozzles	PJ	500,000.00
60.900.061	NAS1-6935-40	Algol IIB Nozzles	PJ	117,000.00
60.900.023	NAS1-7256-27-Ca26-S	Inspection Algol IIB Motor, S/N 55	PK	18,925.00
60.900.101	NAS1-7256-27-Ca26-S	Inspection Algol IIB Motor, S/N 55	PK	-1,777.00
60.900.023	NAS1-7256-33-Ca22-S	Des. & Fab. Algol IIB Clsr. Assys.	PJ	6,307.00
66.000.013	NAS1-10000-16-Ca5-S	Tool for Rocket Motor Igniter	PK	11,203.00
		MOTORS - FIRST STAGE SUBTOTAL		$ 2,315,647.49
SECOND STAGE				
60.400.443	NAS1-5610	14 Castor II Rocket Motors	SENPG	$ 1,282,652.00
60.400.443	NAS1-5610	1 Castor Pyrogen Igniter	NG	1,693.00
60.400.532	NAS1-5883	Castor Motor	PF	97,740.00
60.400.686	NAS1-5883-3	Castor II Rocket Motors	NG	257,747.00
60.400.773	NAS1-6020-35-Ca77-S	Inspect. Castor IIA Nozz. Tool	PI	-109.00
60.400.833	NAS1-6020-35-Ca77-S	Inspect. Castor IIA Nozz. Tool	PI	500.00
60.400.902	NAS1-7256-14-Ca9-S	Inspect. of Castor II Motor at WTR	PJ	2,396.00
60.400.902	NAS1-7256-14-Ca10-S	Inspect. Castor II Motors at WI	PJ	2,024.00
60.400.902	NAS1-7256-20-Ca17-S	Inspect. Castor II Motors at WI	PJ	1,914.00
60.900.101	NAS1-7256-27-Ca29-S	Inspect. Castor II Motor, S/N 184	PJK	2,427.00
60.900.101	NAS1-7256-27-Ca32-S	Crating Castor II Nozz S/N 620-017	PJK	480.00
60.900.023	NAS1-7256-33-Ca35-S	Insp. Castor II Mtr. Noz. Tool 906047	PJ	396.00
60.400.927	NAS1-9273	Castor Motors Shipping Containers	PI	35,703.00
66.000.013	NAS1-10000-9-Ca1-S	Insp. Castor IIA Mtrs. 181, 182, 183	PK	2,686.00
66.000.013	NAS1-10000-16-Ca16-S	Inspect. Castor IIA Mtr. 187 at WI	PK	2,240.00
		MOTORS - SECOND STAGE SUBTOTAL		$ 1,690,489.00
THIRD STAGE				
60.400.621	L-84995	Casting Powder, X-259 Motor	PG	$ 70,602.00
60.400.724	NAS1-5610-7(c10)	Refurb. X-259 Ship. Containers	NG	534.00
60.400.829	NAS1-5610-8(c12)	Mod. X-259 Init. & Nozz. Exit Cone	PF	10,500.00
60.400.766	NAS1-5610-8(c13)	Mods. X-259 Nozzle Exit Cones	PH	2,400.00
60.400.829	NAS1-5610-8(c13)	Mod. X-259 Init. & Nozz. Exit Cone	PF	1,450.00
60.400.433	NAS1-5610	15 Antares X-259 Motors	SENPG	742,326.00

TABLE LXXIV Continued - PHASE V PROGRAM EXPENDITURES

-01 HARDWARE Continued

MOTORS EXPENDITURES (01-02) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
THIRD STAGE Continued				
60.400.532	NAS1-5883-9	Deletion X-259 Rocket Mtr. HIB208	NG	$ -2,800.00
60.400.532	NAS1-5883	6 X-259A3 Motors (LTV)	PF	322,580.50
60.400.773	NAS1-6020-32-S	Cancel Prep. for Ship. X-259 Chmbr.	PI	-657.00
66.000.038	NAS1-10000-12(M2)-T	Initiators, X-259 Motors	PJ	10.34
66.000.013	NAS1-10000-16-Ca15-S	X-ray X-259 Motor HIB-303 at ABL	PK	4,028.00
		MOTORS - THIRD STAGE SUBTOTAL		$ 1,150,973.84
FOURTH STAGE				
60.400.656	NAS1-5610-7(c3)	Tests FW-4S Nozzle Inserts	SGH	$ 21,430.00
60.400.751	NAS1-5610-8(c12)	25 X-259 & 25 X-258/FW-4S Init.	PG	7,625.00
60.400.813	NAS1-5610-10(c16)	Reconf. & Instl. 16 FW-4S Insts.	NGPH	41,413.00
60.400.809	NAS1-5610-10(c17)	Rough Road Test FW-4S Mtr.Shp.Cont.	SH	10,500.00
60.400.870	NAS1-5610-10(c17)	Rough Road Test FW-4S Mtr.Shp.Cont.	SHPI	2,630.00
60.400.875	NAS1-5610-15(M11)	Leak Tests, FW-4S Motors	NGPH	943.00
60.400.914	NAS1-5610-16	Gov. Furnished FW-4S Tooling, UTC	PI	20,154.97
60.400.443	NAS1-5610	15 FW-4S Motors	PFG	410,398.88
60.400.686	NAS1-5883-3	X-258 Motors	NG	78,953.00
60.400.757	NAS1-5883-5	5 X-258E5 Motors	NG	247,958.00
60.400.754	NAS1-5883-6(c5)	Modifications to FW-4S Nozzles	SH	2,712.00
60.400.754	NAS1-5883-6(c9)	Modifications to FW-4S Nozzles	SH	174,380.00
60.400.779	NAS1-5883-7(c17)	Nozzle Inserts, FW-4S Motors	PH	2,400.00
60.400.686	NAS1-5883-10	Deletion 6 X-258 Motors	NG	-10,202.00
60.400.757	NAS1-5883-10	Deletion 6 X-258 Motors	NG	-182,673.00
66.000.082	NAS1-5883-12	Termination Costs, Delet. 6 X258's	NGH	146,000.00
60.400.773	NAS1-6020-35-Ca69-S	Prep. X-258 Motor for Shipment	PI	-228.00
60.400.773	NAS1-6020-35-Ca73-S	FW-4S Nozzle 30302 Modification	PI	346.00
60.400.910	NAS1-6935-21	Examination of FW-4S Nozzle	PI	3,380.00
60.900.038	NAS1-6935-39	Exam. Postfired FW-4S Motor 30301	PJ	2,900.00
60.900.046	NAS1-7256-18(M17)-F	Quality Representative at UTC	EPJ	20,698.00
60.400.902	NAS1-7256-27-Ca11-S	20 Explosive Cartridges	PJ	27,098.00
60.900.023	NAS1-7256-27-Ca11-S	Explosive Cartridges	PJ	492.00
60.900.101	NAS1-7256-27-Ca11-S	20 Explosive Cartridges	PJ	17,626.00
66.000.013	NAS1-10000-9-Ca4-S	Provide RMS Finish on FW-4S Comp.	PK	2,740.00
		MOTORS - FOURTH STAGE SUBTOTAL		$ 1,049,674.85
		TOTAL MOTOR EXPENDITURES		$ 6,206,785.18

TABLE LXXIV Continued - PHASE V PROGRAM EXPENDITURES

-01 HARDWARE Continued

SPARES EXPENDITURES (01-03)

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.816	L-84997	Spares	PI	$ 59,894.00
60.400.958	NAS1-1970-9	Overrun	YC	288.00
60.400.729	NAS1-6020-8-Ca1-L	Spares	PH	13.00
60.400.729	NAS1-6020-8-Ca2-L	Spares	PH	430.00
60.400.729	NAS1-6020-8-Ca3-L	Spares	PH	86.00
60.400.729	NAS1-6020-8-Ca4-L	Spares	PH	2,768.00
60.400.729	NAS1-6020-8-Ca6-L	Spares	PH	-743.00
60.400.729	NAS1-6020-8-Ca7-L	Spares	PH	5,970.00
60.400.729	NAS1-6020-8-Ca8-L	Spares	PH	374.00
60.400.729	NAS1-6020-8-Ca10-L	Spares	PH	78.00
60.400.729	NAS1-6020-11-Ca13-L	Spares	PH	45,000.00
60.400.729	NAS1-6020-14-Ca17-L	Spares	PH	95.00
60.400.729	NAS1-6020-14-Ca19-L	Spares	PGH	9,717.00
60.400.729	NAS1-6020-14-Ca24-L	Spares	PH	11,918.00
60.400.729	NAS1-6020-14-Ca25-L	Spares	PH	1,450.00
60.400.729	NAS1-6020-14-Ca26-L	Spares	PH	165.00
60.400.729	NAS1-6020-14-Ca27-L	Spares	PH	1,287.00
60.400.729	NAS1-6020-14-Ca29-L	Spares	PH	3,505.00
60.400.729	NAS1-6020-14-Ca33-L	Spares	PH	734.00
60.400.729	NAS1-6020-20-Ca40-L	Spares	NGPH	2,125.00
60.400.729	NAS1-6020-20-Ca42-L	Logistics Support	NG	-3,475.00
60.400.729	NAS1-6020-20-Ca43-L	Spares	NG	6,771.00
60.400.729	NAS1-6020-20-Ca44-L	Logistics Support	NG	-4,188.00
60.400.729	NAS1-6020-20-Ca46-L	Spares	NG	-133.00
60.400.729	NAS1-6020-20-Ca50-L	Spares	NG	-100.00
60.400.773	NAS1-6020-20-Ca52-L	Procurement Misc. Spares	NG	-94.00
60.400.729	NAS1-6020-20-Ca53-L	Procurement Misc. Spares	NG	-1,013.00
60.400.729	NAS1-6020-20-Ca55-L	Repl. Phil. React. Cont. Syst.	NG	-4,251.00
60.400.729	NAS1-6020-20-Ca58-L	Procurement of Spares	NGH	1,157.00
60.400.729	NAS1-6020-20-Ca59-L	Procurement of Spares	NGH	2,305.00
60.400.729	NAS1-6020-28-Ca60-L	Procurement of Spares	NGHPIK	13,675.00
60.400.729	NAS1-6020-28-Ca62-L	Procurement of Spares	NG	5,302.00
60.400.729	NAS1-6020-28-Ca63-L	Proc. Spares, Mark II Launcher	NG	3,025.00
60.400.729	NAS1-6020-28-Ca64-L	Procurement of Spares	NG	4,470.00
60.400.729	NAS1-6020-28-Ca65-L	Spares Procurement	NG	3,820.00
60.400.729	NAS1-6020-28-Ca66-L	Procurement of Spares	NG	8,375.00
60.400.729	NAS1-6020-28-Ca67-L	Crating 3 Excess Rkt. Motor Cases	NG	165.00
60.400.729	NAS1-6020-28-Ca70-L	GFE for Instr. Resp. Invest. AVCO	NG	1,749.00
60.400.729	NAS1-6020-36(M20)-L	Spares	PI	-630.00
60.400.729	NAS1-6020-36(M28)-L	Spares	PI	-888.00
60.400.729	NAS1-6020-36-Ca65A-L	Misc. Spares for N_2 Cart	PI	1,333.00
60.400.729	NAS1-6020-36-Ca68-L	Procurement of Spares	NGPI	22,448.00

TABLE LXXIV Continued - PHASE V PROGRAM EXPENDITURES

-01 HARDWARE Continued

SPARES EXPENDITURES (01-03) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.729	NAS1-6020-36-Ca72-L	Proc. Comps.Vinson Fuel.Unit (VAFB)	NGPI	$ 13,510.00
60.400.729	NAS1-6020-36-Ca74-L	Proc. Initiator Cartridge Assys.	PI	21,804.00
60.400.729	NAS1-6020-36-Ca75-L	Spares	NGPI	459.00
60.400.729	NAS1-6020-36-Ca76-L	Procurement of Misc. Spares	PI	4,965.00
60.400.881	NAS1-7256-M	Spares	PIEJ	388,369.90
60.400.931	NAS1-10000-M	Spares	PK	53,571.00
		TOTAL SPARES EXPENDITURES		$ 687,655.90

SHIPPING EXPENDITURES

VEHICLES

NAS1-5610	LTV Shipping	NGPHI	$ 6,909.54
NAS1-6020	LTV Shipping	NGPH	24.20
NAS1-6935	LTV Shipping	PJ	42.63
NAS1-7256	LTV Shipping	PHIJK	236.28

MOTORS

FIRST STAGE

NAS1-4974	Aerojet Shipping	PI	-1,290.75
NAS1-5610	LTV Shipping	NGPHIJ	22,741.80
NAS1-6020	LTV Shipping	PHI	190.34
NAS1-6935-40	LTV Shipping	PJ	3,033.60
NAS1-6935	LTV Shipping	PIJ	864.46
NAS1-7256	LTV Shipping	PJ	7,543.70

SECOND STAGE

NAS1-5610	LTV Shipping	YENGPHJ	24,757.27
NAS1-6020	LTV Shipping	PG	615.25
NAS1-7256	LTV Shipping	PIJK	5,974.23

THIRD STAGE

L-84994	USNAD Shipping	PI	2,526.00
NAS1-5610	LTV Shipping	YENGPHIJ	12,886.35
NAS1-5883	LTV Shipping	PJ	20.14
NAS1-6020	LTV Shipping	PH	145.89
NAS1-6935	LTV Shipping	PK	3,395.80
NAS1-7256	LTV Shipping	PIJ	9,926.67
NAS1-10000	LTV Shipping	PK	1,579.34

TABLE LXXIV Concluded - PHASE V PROGRAM EXPENDITURES

-01 HARDWARE Continued

SHIPPING EXPENDITURES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
MOTORS Continued				
FOURTH STAGE				
	NAS1-3493	Hercules Shipping	PI	$ 7.60
	NAS1-3698	Hercules Shipping	PI	27.40
	NAS1-5592	LTV Shipping	PJ	11.00
	NAS1-5610	LTV Shipping	YENPGPSHIJ	7,990.58
	NAS1-5883	LTV Shipping	PSH	3,104.96
	NAS1-6020	LTV Shipping	PHI	365.51
	NAS1-6935	LTV Shipping	PJK	1,989.43
	NAS1-7256	LTV Shipping	PHJK	11,811.74
	NAS1-9325	ABL Shipping	PK	136.80
	NAS1-10000	LTV Shipping	PIK	853.30
	NAS1-10481	ABL Shipping	PK	207.62
SPARES				
	NAS1-5610	LTV Shipping	PG	30.00
	NAS1-6020	LTV Shipping	YENG	1,195.49
	NAS1-7256	LTV Shipping	PIJ	2,253.40
		SHIPPING SUBTOTAL		$ 132,107.57

TABLE LXXV - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS

MISSION MODS (01-04)

66.000.017	L-58462	Shipment of Material to Africa	PK	$ 187.21
66.000.016	L-58465	Shipment Vans & Material	PK	3,593.75
66.000.058	L-63688	Shipment S-173 Separation System	PK	790.71
66.000.061	L-64916	Material Shipment to Africa	PK	5,000.00
66.000.108	L-71986	Shipment S-163 to Africa	PL	11,781.00
60.400.422	NAS1-3899-40	2 E-Sections, 19 and 21	PF	31,617.00
60.400.542	NAS1-3899-40-1(c1)	2 E-Section Adapter, 19 and 21	PF	317.00
60.400.401	NAS1-3899-44	4 E-Section Sep. Systems for Test	SG	12,000.00
60.400.493	NAS1-3899-44	4 E-Section Sep. Systems for Test	SG	8,412.00
60.400.544	NAS1-5592-1	E-Section Sep. Systems, AD/IE	PF	16,055.00
60.400.847	NAS1-5592-15(c5)	E-Section Mods., Push-Off Rings	PH	360.00

PHASE V (15 SCOUTS)

-01 HARDWARE Continued

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

MISSION MODS (01-04) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.887	NAS1-5880-5	Launch Support for San Marco C	PI	$ 9,300.00
60.400.916	NAS1-5880-5	Launch Support for San Marco C	PI	31,399.02
60.400.557	NAS1-6020-3-C	2 X-258 Cases (for AEC)	PI	1,000.00
60.400.649	NAS1-6020-8-Cal-L	E-Section T/M Batteries	SG	1,939.92
60.400.871	NAS1-6020-24(c7)-K	S-161C Special Instrumentation	PI	2,400.00
60.400.844	NAS1-6020-29(M21)-K	Redsgn. 1st & 2nd Stg.Hdcp.Press.Tb.	PI	9,100.00
60.400.844	NAS1-6020-37(M22)-K	Redsgh. 1st & 2nd Stg.Hdcp.Press.Tb.	PI	-30.00
60.400.857	NAS1-6020-37(M22)-K	Dyn.Balance Upper-D Section	PH	1,370.62
60.400.857	NAS1-6020-37(M22)-K	Dyn. Balance Upper-D Section	PI	-1,370.62
62.400.007	NAS1-6935-4	Mods. for Reentries F and G	PG	159,000.00
60.400.774	NAS1-6935-6	Mods. to 5 E-Sections	PH	2,400.00
60.400.758	NAS1-6935-7	Mods. to 4 E-Section Sep. Sys.	PH	6,000.00
60.400.786	NAS1-6935-7	Mods. to 4 E-Section Sep. Sys.	PH	2,013.00
60.400.798	NAS1-6935-9-1(cl)	Reentry-F Payload RFI Test	PH	750.00
60.400.752	NAS1-6935-11	6 Test and 4 Flt. E-Sect.Sep.Sys.	PH	60,000.00
60.400.846	NAS1-6935-11-3(cl)	E-Section Mods., Push-off Rings	PHI	1,000.00
60.400.903	NAS1-6935-11-3(cl)	E-Sect. Mods., Corr. Push-off Rings	PI	670.00
60.400.891	NAS1-6935-11-4(M2)	Mods. to P/L Sep. Timers, E-Section	PI	33,255.00
60.400.808	NAS1-6935-11-6	Deletion Harness E-Section	PJ	-449.00
60.400.908	NAS1-6935-11-7	E-Section Mods	PJ	1,805.00
60.900.004	NAS1-6935-11-7(M5)	E-Section Mods.	PJ	2,881.00
60.400.891	NAS1-6935-11-9	Final Adjustment of Contract Costs	PI	-15,383.00
60.400.888	NAS1-6935-15-1	Deletion Elec. Harnesses Insp.Req.	PI	-1,582.00
60.400.929	NAS1-6935-29	Level Vib. FAT of 2 SM Sep. Sys.	PI	9,490.00
60.900.045	NAS1-6935-45	Mod. Test E-Section S/N 31	PJ	4,000.00
60.900.049	NAS1-6935-45	Mod. Test E-Section S/N 31	PJ	4,000.00
60.900.074	NAS1-6935-45	Mod. Test E-Section S/N 31	PJ	7,400.00
60.900.071	NAS1-6935-48	E-Sect.Marm.Clamp; UK-4 Bumper Ring	PJ	11,430.00
66.000.117	NAS1-6935-51	UK-4 Payload Test Support	PL	1,600.00
66.000.123	NAS1-6935-51	UK-4 Payload Test Support	PL	1,798.00
60.400.902	NAS1-7256-4-Ca4-S	Des. & Fab. 2 SM Prot. Barriers	PIJ	4,797.00
60.400.939	NAS1-7256-18(M6)-J	Instrumented E-Section	PJ	66,795.00
60.900.029	NAS1-7256-19-J	E-Sect. Instrumentation	PJ	30,000.00
60.900.040	NAS1-7256-19-J	E-Sect. Instrumentation	PJ	24,650.00
60.400.902	NAS1-7256-20-Ca13-S	Mods. to S-177 for GRP-A P/L Ant.Mt.	PJ	1,519.00
60.900.127	NAS1-7256-33-Ca33-S	Fab. SOLRAD-C P/L Protect. Shield	PK	-152.00
60.900.023	NAS1-7256-33-Ca34-S	Prep. Trans. D for 42-in. Ld. Test	PK	2,475.00
60.900.101	NAS1-7256-33-Ca37-S	Special Instrumentation	PK	17,554.00

PHASE V (15 SCOUTS)

-01 HARDWARE Continued

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

MISSION MODS (01-04) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
60.400.931	NAS1-10000-7-J	San Marco	PK	$ 200,000.00
66.000.013	NAS1-10000-9-Ca3-S	Rework San Marco Separation Systems	PK	11,604.00
60.400.931	NAS1-10000-12-R-8	Spec., Sys., Compon. Tests, S-166	PL	25,900.75
60.400.931	NAS1-10000-12-R-9	Rework and Retest S-163	PL	15,040.00
66.000.013	NAS1-10000-14-Ca7-S	GSE Mods Req'd to Support SAS-B Ops.	PK	15,500.00
66.000.055	NAS1-10000-19-Ca9-S	Recertification of S-170	PK	2,650.00
66.000.074	NAS1-10000-19-Ca9-S	Instrumentation for S-170	PL	3,200.00
60.400.931	NAS1-10000-R-3	S-173 Recheckout	PK	34,578.00
60.400.931	NAS1-10000-R-8	S-166 Spec.,Sys., & Comp. Checks	PK	6,352.50
		TOTAL MISSION MODS EXPENDITURES		$ 889,763.86

SHIPPING (01-04)

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
	NAS1-5610	LTV Shipping (OWL)	PH	$ 7.70
	NAS1-5880	Shipping to San Marco	PK	51,939.00
	NAS1-7256	LTV Shipping	PI	4.25
		TOTAL (01-04) SHIPPING EXPENDITURES		$ 51,950.95
		TOTAL MISSION MODS AND SHIPPING EXPENDITURES		$ 941,714.81

-02 SUPPORTING ACTIVITIES

DCASO

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
45.010.051	NAS1-5610(563)	DOD Plant Services	PGH	$ 1,228.00
OSS DIRECT	DCASO FY 1968		PH	37,000.00
OSS DIRECT	DCASO FY 1969		PI	54,500.00
OSS DIRECT	DCASO FY 1970		PJ	59,000.00
OSS DIRECT	DCASO FY 1971		PK	56,000.00
		DCASO SUBTOTAL		$ 207,728.00

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIELD SERVICES (02-01)				
LANGLEY RESEARCH CENTER				
ADB100	L-15974	Stock Issues	PIKL	$ 1,476.14
ADB100	L-15974	Stock Issues, In-House LRC	PK	7,109.43
60.400.819	L-17522	4-St. Switching System Location	PI	14,260.70
60.400.869	L-28229	Calculator and Printer	PI	6,346.71
60.400.926	L-33463	Microfilm Reader	PI	433.35
46.200.129	L-38001	Figure Prepar. for Scout Reports	PJ	2,448.00
52.320.104	L-42743	In-House, LRC	PJ	1,747.60
60.900.086	L-44769	Magnafax Supplies	PJ	107.35
52.340.056	L-46987	In-House, LRC	FJ	26,054.80
52.340.056	L-46987-1	In-House, LRC	PJ	200.00
40.101.028	L-47271	Tool Services, LRC	PJ	378.10
40.101.028	L-47974	Tool Services, LRC	PJ	179.10
12.750.664	L-49093	In-House, LRC	PJ	8,882.80
11.230.846	L-51918	In-House, LRC	PJ	2,650.00
12.750.700	L-52203	In-House, LRC	PJ	2,856.00
60.900.130	L-52956	Magnetic Tape Cartridges	PJ	138.27
52.210.691	L-54154	In-House, LRC	PK	3,168.00
62.500.369	L-54749	Water Quenching Charac. Study,FW4S	PK	2,450.00
52.310.134	L-55447	In-House, LRC	PJ	12,455.10
60.900.182	L-58557	Drafting Machine, Scales	PJ	168.95
60.900.183	L 58561	Compasses, Drafting	PJ	22.56
52.420.991	L-59408	Adhesive	PJK	62.05
66.000.086	L-68372	Dry Silver Paper	PL	49.48
66.000.084	L-88850	Electric Calculator	PK	352.75
66.000.130	L-70313	Book	PL	11.25
66.000.103	L-70776	In-House, 1192-E	PJK	16,090.82
66.000.104	L-70777	In-House, 1192-E	PJ	6,587.68
66.000.101	L-70899	Dry Silver Paper	PL	148.44
66.000.107	L-71083	In-House, 1192-E	PJ	3,734.55
66.000.105	L-71933	In-House, 1192-E	PJ	358.09
66.000.119	L-72437	In-House, 1192-E	PJ	145.53
66.000.118	L-72448	In-House, 1192-E	PJ	446.20
66.000.134	L-73220	In-House, 1192-E	PL	156.39
66.000.131	L-73450	Dry Silver Paper	PL	514.84
66.000.139	L-73616	In-House, 1192-D	PJ	614.75
66.000.140	L-73617	In-House, 1192-D	PJ	555.40
66.000.141	L-73987	In-House, 1192-E	PJ	2,588.16

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

FIELD SERVICES (02-01) Continued

LANGLEY RESEARCH CENTER Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
66.000.131	L-74262	In-House, 1192-E	PJ	$ 306.45
66.000.131	L-74263	In-House, 1192-E	PJ	1,337.74
66.000.143	L-74616	In-House, 1192-E	PJ	80.36
66.000.153	L-75016	In-House, 1192-E	PJ	1,271.05
66.000.159	L-75016-1	In-House, 1192-E	PJ	74.20
66.000.019	L-75016-2	In-House, 1192-E	PJ	167.18
66.000.136	L-75239	Moving charges on Printer & Camera	PL	144.00
66 000.158	L-75562	In-House, 1192-E	PJ	271.22
66.000.161	L-75662	In-House, 1192-E	PJ	17.75
66.000.161	L-75663	In-House, 1192-E	PJ	196.95
66.000.167	L-77087	In-House, 1192-E	PJ	156.44
66.000.167	L-77088	In-House, 1192-E	PJ	78.70
66.000.169	L-77604	In-House, 1192-E	PJ	11.92
66.000.176	L-77951	Riser for 3M Printer	PJ	237.63
66.000.190	L-79800	In-House, 1192-E	PJ	347.12
66.000.192	L-79800	In-House, 1192-E	PJ	179.87
66.000.193	L-80112	In-House, 1192-E	PL	69.43
66.000.215	L-80112	In-House, 1192-E	PK	58.05
66.000.211	L-80802	In-House, 1192-E	PK	102.90
66.000.212	L-81694	In-House, 1192-E	PK	116.12
47.000.011	L0152410367	In-House, LRC	PK	233.82
40.101.028	L0252220096	Tool Services, LRC	PJ	560.00
47.000.013	L0352220683	In-House, LRC	PK	1,925.00
40.101.040	L0352220881	In-House, LRC	PK	1,225.00
47.000.028	L0452220277	In-House, LRC	PL	1,000.00
47.000.016	L0452220818	In-House, LRC	PK	600.00
40.101.031	L0452230581	In-House, LRC	PJ	760.00
52.230.179	L0552230179	In-House, LRC	PK	174.12
47.000.023	L0652220074	In-House, LRC	PL	437.80
40.101.034	L0852230760	In-House, LRC	PJ	417.90
47.000.021	L0852260982	In-House, LRC	PL	216.00
40.101.039	L0952220768	In-House, LRC	PK	245.00
52.239.806	L0952230806	In-House, LRC	PJ	585.00
40.101.032	L1852220413	In-House, LRC	PJ	280.00
40.101.034	L-1852230767	In-House, LRC	PJ	1,160.00
40.101.034	L-1852230768	In-House, LRC	PJ	980.00
47.000.023	L1852410857	In-House, LRC	PL	520.00
47.000.024	L4552420426	In-House, LRC	PL	41.79
47.000.011	L4752220514	In-House, LRC	PK	730.00
66.000.114	OL-71787	In-House, 1192-E	PJ	509.22
66.000.121	OL-73726	In-House, 1192-E	PJ	925.00

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIELD SERVICES (02-01) Continued				
LANGLEY RESEARCH CENTER Continued				
56.130.202	0L-74084	In-House, 1192-E	PJ	$ 540.54
56.130.290	0L-74126	In-House, 1192-E	PJ	706.00
56.130.427	0L-74126-1	In-House, 1192-E	PJ	196.00
66.000.162	0L-74981	In-House, 1192-E	PJ	88.50
56.130.371	0L-76223	In-House, 1192-E	PL	60.00
66.000.166	0L-76282	In-House, 1192-E	PL	98.70
52.420.683	0L-76574	In-House, 1192-E	PL	35.00
66.000.170	0L-76863	In-House, 1192-E	PJ	169.90
66.000.186	0L-77345	Slide Projector lamps	PJ	33.41
66.000.175	0L-77400	In-House, 1192-E	PJ	84.46
66.000.183	0L-77585	Push-Pins	PJ	34.56
66.000.180	0L-77845	In-House, 1192-E	PJ	108.00
66.000.177	0L-77855	Slide Tray	PJ	49.68
66.000.178	0L-77856	Transparencies	PJ	107.15
56.130.570	0L-78273	In-House, 1192-E	PJ	190.00
52.102.054	0L-79013	In-House, 1192-E	PL	22.60
66.000.202	0L-79570	In-House, 1192-E	PJ	16.83
66.000.200	0L-79632	In-House, 1192-E	PK	498.00
66.000.201	0L-80204	In-House, 1192-E	PJ	47.27
66.000.217	0L-81070	In-House, 1192-E	PL	28.29
60.900.083	80330100930-082	Arch Board File	PJ	7.80
60.900.083	80330100930-083	Arch Board File	PJ	2.76
11.000.266	NAS1-6090-92	In-House, LRC	PK	31,000.00
60.400.790	NAS1-7256-5-P	Langley Support	PJ	278,240.85
12.750.723	NAS1-7947-9	In-House, LRC	PJ	35,000.00
12.700.082	NAS1-7947-12	In-House, LRC	PJ	49,461.00
51.240.114	NAS1-8330	In-House, LRC	PJ	93.28
57.000.004	NAS1-8348	In-House, LRC	PJ	210.08
56.130.533	NAS1-9057-58	In-House, LRC	PJ	105.00
56.130.533	NAS1-9057	In-House, LRC	PJ	300.55
46.200.132	NAS1-9066-124	Langley Working Paper 804	PJ	1,378.91
46.200.132	NAS1-9066-140	Figure Preparation	PJ	363.73
46.200.132	NAS1-9066-361	In-House, LRC	PK	356.75
46.200.132	NAS1-9066-519	Vu-graphs	PJ	35.73
46.200.284	NAS1-9788-533	In-House, LRC	PK	105.00

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

FIELD SERVICES (02-01) Continued

LANGLEY RESEARCH CENTER Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
46.200.284	NAS1-9788-570	In-House, LRC	PK	$ 6.50
46.200.284	NAS1-9788	In-House, LRC	PK	553.97
52.410.837	NAS1-9789	In-House, LRC	PK	150,000.00
57.000.011	NAS1-9933	In-House, LRC	PJ	5,000.00
60.400.931	NAS1-10000-P	Langley Support	PK	40,697.00
56.330.349	NAS1-10166	In-House, 1192-E	PI	18,000.00
56.330.377	NAS1-10166	In-House, 1192-E	PI	450.00
52.110.328	NAS1-10363	In-House, LRC	PK	11,688.00
52.210.569	NAS1-10369	In-House, LRC	PK	4,052.50
52.220.185	NAS1-10380	In-House, LRC	PK	22,998.00
52.220.116	NAS1-10381	In-House, LRC	PK	8,149.00
52.210.580	NAS1-10407	In-House, LRC	PK	8,950.00
52.310.135	NAS1-10415	In-House, LRC	PK	4,020.00
52.310.130	NAS1-10419	In-House, LRC	PK	3,195.72
52.210.575	NAS1-10449	In-House, LRC	PK	11,055.00
52.310.131	NAS1-10519	In-House, LRC	PK	6,740.00
52.110.318	NAS1-10612	In-House, LRC	PK	8,569.00
57.110.693	NAS1-10648	In-House, LRC	PK	3,860.00
52.110.323	NAS1-10659	In-House, LRC	PK	8,675.00
56.330.471	NAS1-10695-1	In-House, 1192-E	PI	7,233.24
56.330.502	NAS1-10695-2	In-House, 1192-E	PI	180.49
56.330.547	NAS1-10695-3	In-House, 1192-E	PJ	138.88
56.330.601	NAS1-10695-4	In-House, 1192-E	PJ	246.42
56.330.422	NAS1-10695	In-House, 1192-E	PI	195,400.00
56.130.703	NAS1-11256	In-House, 1192-E	PL	297.35
		LANGLEY RESEARCH CENTER SUBTOTAL		$1,064,632.47

WALLOPS STATION

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
ADB100	L-15974	Stock Issues	PHIJKL	$ 2,761.26
56.130.913	L-30895-33	Anodizing Aluminum Plate	PJ	37.99
56.130.011	L-30895-34	Wire Pendant	PJ	269.21
40.101.010	L-34548	Display Case	PI	265.00
60.400.941	L-36308	Slides Files	PI	56.15
60.900.027	L-41644	Books	PJ	80.56
60.900.032	L-43254	Motor Shipments, Recording Dev.	PJ	513.72

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIELD SERVICES (02-01) Continued				
WALLOPS STATION Continued				
60.900.041	L-43727	Sheet of Pegboard	PJ	$ 7.88
66.000.030	L-44758	Fram	PK	3.76
52.340.174	L-46146	Spin Balance Tables	PJ	1,805.03
60.900.093	L-50465	Accelerometer	PJ	1,124.23
60.900.103	L-50848	Hydraulic Fittings	PJ	86.66
52.330.136	L-51744	Vacuum Gage	PJ	298.00
66.000.032	L-59683	Purolators	PK	86.39
66.000.089	L-68848	Rental of Copier	PL	150.50
66.000.093	L-69532	Polaroid Film	PL	60.00
66.000.129	L-71225	Butler Buildings for Mtr. Dol.Strg.	PL	16,544.00
66.000.115	L-71779	Rental on Copier for Wallops	PL	157.50
11.230.047	L-73421	Digital Magnetic Tapes	PL	180.00
52.330.131	L1752330131	Vacuum Tubing	PJ	156.25
52.230.348	L1852230348	Beam Plate	PK	248.00
52.230.397	L2152230397	Gears	PI	11.27
52.420.861	L2452420861	Sealant Gun	PI	74.85
66.000.033	OL-59819	Valves	PK	60.45
60.400.585	NAS1-1295	Adjust Escrow/Return Crew to Dallas	PF	-22,145.00
20.200.637	NAS1-3899-1	Final Payment on Task Order	PL	2.00
60.400.557	NAS1-6020-9-M	FY67 Launch Services	PH	777,145.61
20.200.579	NAS1-6020-15-M	Return Crew to Dallas	PH	10,[illegible]8.00
60.900.044	NAS1-6020-38-M	Retransfer of Exp., WI Personnel	PI	-27,037.00
60.400.790	NAS1-7256-5-N	Wallops Island Support	PJ	730,372.00
60.900.044	NAS1-7256-16-N	Retransfer Exp., WI Personnel	PJ	27,037.00
60.400.790	NAS1-7256-N	Wallops Field Services	PI	400,000.00
60.400.931	NAS1-10000-12-R-24	Replacement of GFE Cable	PL	340.00
60.400.931	NAS1-10000-N	Field Services Support	PK	802,000.00
60.400.931	NAS1-10000-R-17	Equipment Inventory at Wallops	PK	1,571.08
60.400.931	NAS1-10000-R-24	Replacement of GFE Cable	PL	15.00
66.000.031	NAS1-10650	Reflectoscope	PHJK	5,665.00
	Suballotment Wallops		PJKL	210,000.00
		WALLOPS STATION SUBTOTAL		$ 2,941,002.35

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

FIELD SERVICES (02-01) Continued

WESTERN TEST RANGE

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
ADB100	L-15974	Stock Issues	PI	$ 785.44
52.420.541	L-25466	Aluminide Powder	PI	225.00
01.030.095	L-25815	Actuator Bracket	PI	86.00
40.101.002	L-27402	Catalyst	PI	340.00
60.005.001	L-52043	Typewriter, Electric'	PJ	927.00
60.900.134	L-52073	FY71 Ops. and Maint. Expends.,WTR	PK	8,911.50
66.000.022	L-58934	Property Tags	PK	226.92
66.000.065	L-64709	FY72 Ops. and Maint. Expends., WTR*	PL	5,375.00
66.000.064	L-66100	Microfilm Dry Printer	PK	8,387.88
66.000.064	L-71168	Maintenance Services,Microfilm Ptr.	PK	283.35
60.400.946	L-84994-2	Storage of Scout Rocket Mtrs.-Nev.	PI	2,000.00
60.900.033	L-84994-3	Storage of Scout Rocket Mtrs.-Nev.	PJ	2,000.00
60.900.092	L-84994-4	Storage of Scout Rocket Mtrs.-Nev.	PJ	2,000.00
60.900.185	L-84994-5	Storage of Scout Rocket Mtrs.-Nev.	PJ	2,000.00
40.101.015	L-0152410787	Machine Fabrication Material	PI	1,990.00
01.030.095	L-0352220079	Tool and Electrical Services	PI	2,100.00
01.030.097	L-0352220079-1	Tool and Electrical Services	PI	280.00
60.400.557	NAS1-6020-9-N	AFWTR Field Team	PH	2,653.00
60.900.056	NAS1-6935-47	Pre. Std. Hdl. Proc. Man., NAD	PJ	8,000.00
60.900.091	NAS1-6935-47	Prep. Std. Handl. Proc. Man., NAD	PJ	5,600.00
60.900.055	NAS1-7256-21-N	50% VAFB Lnch.Srvs. 7/1/70-11/1/70	PJ	37,907.00
60.400.841	NAS1-8584	Rate-of-turn Table	PI	15,750.00
AF-04(701)-68-C-0072		50% Support at VAFB-FY68	NG	164,200.00
AF-04(701)-68-C-0252		50% Support at VAFB-FY69	YI	158,350.00
AF-04(701)-68-C-0252		50% Support at VAFB-FY70	NJ	134,250.00
66.000.047	NAS1-10000-12(M11)-N	Transpor.Launch Ops.Supt-VAFB	PIK	11,259.00
66.000.056	NAS1-10000-12(M11)-N	Transpor.Lanuch Ops.Supt-VAFB	PK	26,000.00
60.400.931	NAS1-10000-17-N	Field Services Support	PL	546,000.00
60.400.931	NAS1-10000-24-N	Field Services Support	PL	276,145.00
60.400.931	NAS1-10000-N	Field Services Support	PK	501,000.00
60.400.931	NAS1-10000-R-17	Equipment Inventory at WTR	PK	1,571.09
66.000.031	NAS1-10650	Reflectoscopes	PK	5,665.00
66.000.066	NAS1-11067	Band Saw for WTR-LTV	PK	5,921.00
	Suballotment WTR		PIJK	124,788.00
		WESTERN TEST RANGE SUBTOTAL		$ 2,062,977.18

---

*E04ACFC70 + $10,750.00

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02)				
ADB100	L-15374	Stock Issues	PIJKL	$ 3,914.84
60.900.024	L-42376	Scout Training & Info. Program	PJ	1,384.00
60.900.066	L-46232	Gas Booster Pump	PJ	750.00
60.900.067	L-46624	Lockheed Engineer for TOLIP	PJ	1,735.00
52.310.193	L-56423	Connectors	PJ	130.16
60.900.173	L-56501	Calculator	PK	10,128.60
66.000.003	L-56966	Shipment of Scout Vehicle	PK	12,831.59
60.900.175	L-58023	Printer, Dry	PK	16,720.55
66.000.014	L-58134	Conservafile	PK	126.08
66.000.019	L-58484	Navy Services Ship. Matl.to Africa	PK	3,982.96
66.000.018	L-58808	Microforms	PK	607.75
66.000.036	L-62709	Microfilm Processor-Camera	PK	11,566.84
66.000.073	L-66982	Magnafax Supplies	PI	25.39
60.900.091	L-69095	Shipment of S-163 Motors	PL	3,799.29
60.900.175	L-71168	Dry Silver Printer	PK	1,486.67
66.000.036	L-71168	Processor, Camera	PK	-140.33
66.000.148	L-74595	Transportation Charges,Photo Equip.	PL	104.84
66.000.111	OL-71146	Film for SSS-A Launch	PL	57.12
60.900.013	NAS1-5592-17	Overhead Rate Adjustment	PJ	23,776.00
60.400.557	NAS1-6020-9-C	Preflight Planning	PI	2,700.00
60.400.557	NAS1-6020-9-D	Data Analysis	PH	163,623.26
60.400.557	NAS1-6020-9-E	Systems Engineering	SH	121,672.41
60.400.557	NAS1-6020-9-F	Reliability	PSH	326,535.00
60.400.557	NAS1-6020-9-G	Standardization	PH	210,431.00
60.400.675	NAS1-6020-19-Ca37-S	X-258 Aging Program	SH	45,587.00
60.400.880	NAS1-6020-37(M26)-B	GRS P/L-to-Veh. Compat. Anal.	PI	120.00
60.400.557	NAS1-6020-A	Prime Contract Management	SG	414,189.00
60.400.557	NAS1-6020-B	Payload Coordination	SF	47,230.00
60.400.557	NAS1-6020-C	Preflight Planning	SF	61,591.00
60.400.447	NAS1-6020-D	Data Analysis	SF	662.74
60.400.557	NAS1-6020-E	Systems Engineering	SFGPIK	223,414.34
60.400.557	NAS1-6020-F	Reliability	SFG	8,256.50

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02) Continued				
60.400.557	NAS1-6020-L	Logistics	SG	$ 16,661.08
60.400.557	NAS1-6020-P	LRC Field Support	SG	73,555.00
60.400.765	NAS1-6935-12	EX-38 Cartridges for S/H Sep.Sys.	SH	35,000.00
60.400.814	NAS1-6935-12	Dev. and Qual. EX-38 Cartridges	SH	18,587.00
66.000.095	NAS1-6935-12-5	Development of EX-38 Cartridges	PL	13,521.00
60.400.889	NAS1-6935-19	Hydraulic Test Equipment	PI	6,750.00
60.400.878	NAS1-6935-22	Ext. Shelf Life FW-4S Motors	PI	17,257.00
60.400.925	NAS1-6935-26	Ext. Sheif Life Castor IIA	PI	13,100.00
60.400.930	NAS1-6935-27	Castor II Mtr. Aging Prog. Tstg.	PI	2,680.00
60.900.002	NAS1-6935-32	Revisions to Scout SOP	PJ	42,575.00
60.900.002	NAS1-6935-32-2	Revisions to Scout SOP	PJ	-711.00
60.900.014	NAS1-6935-35	Mod. GSE to Accom. SBASI in Veh.	PJ	29,500.00
60.900.026	NAS1-6935-38	Shelf Life Ext., FW-4S Motors	PJ	84,000.00
60.900.140	NAS1-6935-41-4(M3)	Scout D Wind Tunnel Test Data	PJ	50,000.00
60.900.144	NAS1-6935-41-4(M3)	Wind Tunnel Test Data & FW4S Case	PJ	11,420.00
60.900.054	NAS1-6935-43	3rd,4th,5th-Stg.Mtr.Shlf.Life Stdy.	PJ	15,602.00
60.900.070	NAS1-6935-49	Sep.Sys.Test Planning Guide Manual	PJ	6,000.00
60.900.095	NAS1-6935-49	Sep.Sys.Test Planning Guide Manual	PJ	4,490.00
60.400.902	NAS1-7256-4-Ca1-S	Packing Matl. for Shipment S-163R	PIJ	532.00
60.400.902	NAS1-7256-4-Ca2-S	Repl. Dwgs. & Specs., Emrg. Supt.	PIJ	5,600.00
60.400.902	NAS1-7256-4-Ca3-S	Initiators	PJ	76,512.00
60.400.790	NAS1-7256-5-A	Program Management	SHPJ	877,076.44
60.400.790	NAS1-7256-5-B	Payload Coordination	PJ	132,353.90
60.400.790	NAS1-7256-5-C	Preflight Planning	PJ	66,985.00
60.400.790	NAS1-7256-5-D	Data Reduction and Analysis	PJ	250,032.93
60.400.790	NAS1-7256-5-G	Standardization & Config. Control	PJ	469,304.00
60.400.902	NAS1-7256-14-Ca7-S	Test 4th Stg. Limit. Resist. Box	PJ	6,524.00
60.400.902	NAS1-7256-14-Ca8-S	Eval. Tests Ignition Sys. Circuits	PJ	7,178.00
60.900.012	NAS1-7256-18(M8)-E	Incorp. Instr. for SBASI Flt. Eval.	PJ	19,071.00
60.900.015	NAS1-7256-18(M9)-E	Ignition Modifications	PJ	14,416.00
60.400.790	NAS1-7256-18-C	Preflight Planning	PJ	62,632.29
60.400.790	NAS1-7256-18-E	System Engineering	PIJK	-15,808.83
60.400.790	NAS1-7256-18-F	Reliability Program	PHIJ	904,131.64
60.400.790	NAS1-7252-18-G	Standardization & Config. Control	PJ	34,138.78
60.400.790	NAS1-7256-18-W	Certification Training	PJ	-2,418.86

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02) Continued				
60.400.902	NAS1-7256-20-Ca12-S	Fab. of Scout Test Cables	PJ	$ 4,081.00
60.900.023	NAS1-7256-20-Ca19-S	X-258,X-259 Ign.Shelf Life Program.	PJ	10,195.00
60.400.902	NAS1-7256-23-Ca8-S	Eval. Tests Scout Ign.Sys.Circuits	PJ	-2,268.00
60.400.902	NAS1-7256-27-Ca16-S	Flt.Ist. 14/3-lb. Roll Motors	PJ	13,426.00
60.900.023	NAS1-7256-27-Ca16-S	Flt. Instr.14/3-lb. Roll Motors	PJ	22,074.00
60.900.101	NAS1-7256-27-Ca16-S	Flt. Instr.14/3-lb. Roll Motors	PJ	-2,000.00
60.900.023	NAS1-7256-27-Ca24-S	Heat Shield Neg.Pressure Tests	PJ	-766.00
60.900.101	NAS1-7256-27-Ca24-S	Heat Shield Neg.Pressure Tests	PK	1,800.00
60.900.023	NAS1-7256-27-Ca25-S	X-258 Igniter Shelf Life Ver. Prg.	PJ	-2,062.00
60.900.101	NAS1-7256-27-Ca28-S	Castor II Shelf Life Extension	PK	-4,935.00
60.900.088	NAS1-7256-30(M24)-G	Rev. Vol. III Rocket Motor Manual	PK	17,815.00
66.000.006	NAS1-7256-30(M24)-G	Reconstruction of SOP, Vol. III	PK	7,323.00
60.400.902	NAS1-7256-33-Ca14-S	Inspection T/M Pkg. & Transmitter	PJ	250.00
60.900.101	NAS1-7256-33-Ca14-S	Inspection T/M Pkg. & Transmitter	PK	1,922.00
60.900.023	NAS1-7256-33-Ca20-S	X-258 Ignition Shelf Life Verif.	PK	-19,000.00
60.900.101	NAS1-7256-33-Ca38-S	Reprod. Doc. Pertinent to Apollo	PK	408.00
60.900.023	NAS1-7256-33(M20-Ca19)-S	X-258,X-259 Ign. Shlf.Lf.Pr.	PK	-1,400.00
60.400.882	NAS1-7256-34	Incentive Award	PK	425,000.00
60.400.790	NAS1-7256-35-B	Payload Coordination	PJ	9,357.00
60.400.790	NAS1-7256-35-C	Preflight Planning	PJ	-35,406.00
60.400.790	NAS1-7256-35-D	Data Reduction and Analysis	PJK	-427,570.00
60.400.790	NAS1-7256-A	Program Management	SH	777,936.88
60.400.790	NAS1-7256-E	Systems Engineering	SH	1,389,000.00
60.400.790	NAS1-7256-X	Documentary Film	SH	23,000.00
52.230.961	NAS1-9043-1	Model for Jet Vane Tests	PJ	830.42
60.400.934	NAS1-9154-1	Flight Tape Recorder	PI	24,176.00
66.000.013	NAS1-10000-9-Ca10-S	Castor II Shlf.Life Ext.Prog.	PK	12,164.00
66.000.013	NAS1-10000-9-Ca12-S	Purging of S-166	PK	3,053.00
66.400.931	NAS1-10000-12-C	Preflight Planning	PL	45,836.00
60.400.931	NAS1-10000-12-R-10	Refurb. Misc. Comps.from S-144	PL	13,335.00
60.400.931	NAS1-10000-12-R-14	Scout Vehicle Simulator	PL	5,324.00
60.400.931	NAS1-10000-12-R	Special Programs	PL	18.00
60.400.931	NAS1-10000-17-B	Payload Coordination	PL	2,284.00
60.400.931	NAS1-10000-17-C	Preflight Planning	PL	60,000.00
60.400.931	NAS1-10000-17-D	Data Reduction and Analysis	PL	7,045.00
60.400.931	NAS1-10000-17-K	Certification Training	PL	763.00
60.400.062	NAS1-10000-17(M15)-T	Fourth-Stage Ign. and T/M Systems	PK	26,191.66
60.400.931	NAS1-10000-A	Program Management	SEPIK	278,421.00
60.400.931	NAS1-10000-B	Payload Coordination	PK	33,689.00
60.400.931	NAS1-10000-C	Preflight Planning	PK	28,770.00
60.400.931	NAS1-10000-D	Data Reduction and Analysis	PK	285,850.00
60.400.931	NAS1-10000-E	Systems Engineering	PBCSPDPSEPFGJK	366,644.47
60.400.931	NAS1-10000-F	Reliability Program	PK	138,112.00

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
PRODUCTION SUPPORT (02-02) Continued				
60.400.931	NAS1-10000-G	Standardization & Config. Cont.	VCSDPK	$ 56,866.00
60.400.931	NAS1-10000-K	Certification Training	PK	1,500.00
60.400.931	NAS1-10000-R-14	Scout Vehicle Simulators	PKL	23,999.00
60.400.931	NAS1-10000-R-26	Des. Imp. and Test Scout N_2 Regs.	SDEPKL	30,651.00
60.400.931	NAS1-1000-R	Special Programs	PK	17,443.08
60.900.118	NAS1-10482	Technical Support by Thiokol	SH	181.33
60.900.119	NAS1-10483	Technical Support by HI/Bacchus	PK	89,694.00
66.000.075	NAS1-10900-1	LTV Programer SPO, 12 Mos.	PIJK	20,000.00
		PRODUCTION SUPPORT TOTAL		$ 8,845,268.81
LOGISTICS (02-03)				
60.400.790	NAS1-7256-18-L	Logistics Support Management	PJ	$ 308,653.64
60.400.931	NAS1-10000-L	Logistics Support Management	PK	57,975.00
		LOGISTICS SUBTOTAL		$ 366,628.64
SHIPPING				
	L-46232	Teledyne Shipping	PJ	$ 33.50
	L-47001	Wallops Shipping	PJ	3,260.00
	L-75663	Langley Shipping	PJ	9.45
	L-77088	LRC Shipping	PL	13.88
	NAS1-4794	Aerojet Shipping	PI	1,850.40
	NAS1-5610	LTV Shipping	PI	3,416.20
	NAS1-5883	LTV Shipping	PI	564.40
	NAS1-6020	LTV Shipping	PIJK	7,964.12
	NAS1-6378	LTV Shipping	PIJK	102.98
	NAS1-6935	LTV Shipping	SHPIJK	1,380.81
	NAS1-6935-41	LTV Shipping	PJ	8.17
	NAS1-7256	LTV Shipping	PHIJKL	42,975.86
	NAS1-10000	LTV Shipping	PIJKL	11,725.19
		SHIPPING SUBTOTAL		$ 73,304.96

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-02 SUPPORTING ACTIVITIES Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
SAN MARCO				
ADB100	L-15974	Stock Issues	PJ	$ 25.53
66.000.081	OL-67020	Return of Shipping Containers, S175	PK	96.76
60.400.887	NAS1-5880-5	San Marco Support, 12-mo. Ext.	PI	88,000.00
60.900.047	NAS1-5880-6	Extension of Contract	PJ	83,850.00
60.900.167	NAS1-5880-8	Increase in Material Effort	PK	25,000.00
	NAS1-5880	LTV Shipping	PJK	62,514.88
	NAS1-7256	LTV Shipping	PIJK	6,149.16
66.000.013	NAS1-10000-9-Ca2-S	Packaging & Crating San Marco C	PK	989.00
60.400.931	NAS1-10000-17-J	San Marco Support	PK	100,000.00
66.000.209	NAS1-10000-30-J	San Marco Support	PM	57,056.00
60.400.931	NAS1-10000-J	San Marco Support	PK	107,000.00
	NAS1-10000	LTV Shipping	PJ	13.50
OSS DIRECT		SAS-A Launch Costs	PJ	547,000.00
		SSS-A Launch Costs	PK	547,000.00
		SAS-B Launch Costs	PL	597,000.00
		SAN MARCO SUBTOTAL		$ 1,624,694.83
		TOTAL -02 SUPPORTING ACTIVITIES EXPENDITURES		$17,189,237.24
PRODUCT IMPROVEMENT (03-00)				
ALGOL NOZZLE				
60.400.845	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Insert	SG	$ 7,968.25
		ALGOL NOZZLE SUBTOTAL		$ 7,968.25
FAILURE INVESTIGATION				
60.400.742	NAS1-6020-13-Ca15-R	S-152 Failure Investigation	SG	$ 200,000.00
60.400.747	NAS1-6020-13-Ca16-R	X-259 Tests and Analyses on S-152	SG	51,000.00
		FAILURE INVESTIGATION SUBTOTAL		$ 251,000.00
FIFTH STAGE				
62.510.186	L-5009	BE-3 Casting Powder	SG	$ 1,166.00
60.400.667	NAS1-5592-9	Eval. Heat Shield for Sunblazer P/L	SG	10,000.00
60.400.865	NAS1-6868-9(M4)	Back-up Signal Conditioners	SG	33.95
60.400.633	NAS1-6868	Fifth-Stage Velocity Package	SG	1,000,000.00

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NASA SPECIALS Continued

-03 PRODUCT IMPROVEMENT Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
FIFTH STAGE Continued				
60.400.728	NAS1-6868	Fifth-Stage Velocity Package	SG	$ 158,275.00
62.510.055	NAS1-7102	BE-3-A9 Motors	SG	197,000.00
		FIFTH STAGE SUBTOTAL		$ 1,366,474.95
SHIPPING				
	NAS1-6868	LTV Shipping	SG	$ 6.02
		SHIPPING SUBTOTAL		$ 6.02
		TOTAL -03 PRODUCT IMPROVEMENT EXPENDITURES		$ 1,625,449.22
		NASA SPECIALS SUBTOTAL		$19,756,401.27

NAVY SPECIALS

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
MISSION MODS (01-04)				
60.900.127	NAS1-7256-33-Ca33-S	Fab. SOLRAD-D P/L Protect. Shield	NK	$ 2,600.00
60.900.023	NAS1-7256-33-Ca34-S	Prep. Trans. D for 42" Static Load Test	NH	209.00
60.400.931	NAS1-10000-17-R-7	Verification X-258 Igniter Integr.	NH	400.50
60.400.931	NAS1-10000-17-R-16	Verif. X-258 Igniter Integrity	NH	1,897.00
60.400.931	NAS1-10000-17-R-27	N-17 Heat Shield Design and Mod.	NH	4,200.00
60.400.931	NAS1-10000-R-7	Verification X-258 Igniter Integr.	NH	645.50
60.400.931	NAS1-10000-R-27	N-17 Heat Shield Design and Mod.	NH	1,236.00
		Travel (66-95)	NGHK	170,134.24
		TOTAL MISSION MODS EXPENDITURES		$ 181,286.24
SUPPORTING ACTIVITIES (02-00)				
DCASO				
01.030.050	NAS1-5610(563,564)	DOD Plant Services	YFNG	$ 39,775.50
OSS DIRECT DCASO FY 1968			PH	37,000.00
OSS DIRECT DCASO FY 1969			PI	54,500.00
OSS DIRECT DCASO FY 1970			PJ	59,000.00

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NAVY SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
DCASO Continued				
OSS DIRECT DCASO FY 1971			PK	$ 56,000.00
OSS DIRECT DCASO FY 1972			PL	69,000.00
		DCASO SUBTOTAL		$ 315,275.50
WESTERN TEST RANGE				
60.900.134	L-52073	FY71 Ops. & Maint. Expends., WTR	NG	$ 8,911.50
66.000.065	L64709	FY72 Ops. & Maint. Expends., WTR	NH	5,375.00
60.400.055	NAS1-7256-21-N	50% VAFB Launch Serv.7/1/70-11/1/70	NG	75,813.00
60.900.143	NAS1-7256-29-N	Technician at WTR, Sept. Oct. 1970	NG	3,756.00
		WESTERN TEST RANGE SUBTOTAL		$ 93,855.50
PRODUCTION SUPPORT (02-02)				
60.400.957	NAS1-1928-12-2	Overrun	YC	$ 186.00
60.400.957	NAS1-1928-17-2	Overrun	YC	839.00
60.400.557	NAS1-6020-33-C	Termination	NG	-33,686.00
60.400.557	NAS1-6020-41-E	Underrun	NG	-354,113.00
60.400.557	NAS1-6020-42-E	Termination Sale Material Credit	NG	-142.26
60.400.557	NAS1-6020-C	Preflight Planning	YF	33,686.00
60.900.054	NAS1-6935-43	3rd,4th,5th-Stg. Mtr. Shelf Life Study	NH	59,637.00
60.400.790	NAS1-7256-5-A	Program Management	NG	124,000.00
60.400.790	NAS1-7256-5-B	Payload Coordination	NG	20,000.00
60.400.790	NAS1-7256-5-C	Preflight Planning	NG	34,000.00
60.400.790	NAS1-7256-5-D	Data Reduction and Analysis	NG	11,571.46
60.400.790	NAS1-7256-18-D	Data Reduction and Analysis	NG	217,189.00
60.400.790	NAS1-7256-18-E	Systems Engineering	NG	3,467.26
60.400.790	NAS1-7256-18-F	Reliability Program	NGH	192,784.74
60.400.790	NAS1-7256-18-G	Standardization & Config. Control	YI	47,531.41
60.400.790	NAS1-7256-18-J	S-163CR Refurbishment	YI	163,000.00
60.400.790	NAS1-7256-18-W	Certification Program	NG	30,000.00
60.900.023	NAS1-7256-27-Ca28-S	Castor II Shelf Life Ext. Prog.	NH	80,000.00
60.400.931	NAS1-10000-17-R-17	Inventory & Tag GFE at WI & VAFB	NH	5,303.83
60.400.931	NAS1-10000-17-R	Special Programs	NH	36.00
60.400.931	NAS1-10000-R	Special Programs	NH	55,802.17
60.900.172	NAS1-10481	Tech. Support by Hercules Inc./ABL	NH	99,996.00
		PRODUCTION SUPPORT SUBTOTAL		$ 791,088.61

PHASE V (15 SCOUTS)

TABLE LXXV Continued - PHASE V SPECIALS EXPENDITURES

NAVY SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
LOGISTICS (02-03)				
60.400.790	NAS1-7256-18-L	Logistics Support	YCE	$ 12,279.25
		LOGISTICS SUBTOTAL		$ 12,279.25
SHIPPING				
	NAS1-7256	LTV Shipping	NG	$ 23.93
		SHIPPING SUBTOTAL		$ 23.93
		TOTAL -02 SUPPORTING ACTIVITIES EXPENDITURES		$ 1,212,522.79
PRODUCT IMPROVEMENT (03-00)				
ROLL AND YAW				
60.900.009	NAS1-7256-18(M7)-H	Roll and Yaw Compensation	NG	$ 48,280.00
		ROLL AND YAW SUBTOTAL		$ 48,280.00
		TOTAL -03 PRODUCT IMPROVEMENT EXPENDITURES		$ 48,280.00
		NAVY SPECIALS SUBTOTAL		$ 1,442,089.03

ESRO IB SPECIALS

SUPPORTING ACTIVITIES (02-00)

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
MISSION MODS (01-04)				
60.400.939	NAS1-7256-18(M6)-H	Instrumented E-Section	EJ	$ 6,782.00
60.900.015	NAS1-7256-18(M9)-H	Ignition Mods	EJ	1,150.00
60.900.020	NAS1-7256-18(M12)-T	Heat Shield Mods	EJ	612.00
		TOTAL MISSION MODS EXPENDITURES		$ 8,544.00

PHASE V (15 SCOUTS)

TABLE LXXV Concluded - PHASE V SPECIALS EXPENDITURES

ESRO IB SPECIALS Continued

SUPPORTING ACTIVITIES (02-00) Continued

P.R. NO.	ORDER NO.	ITEM	FUNDS	TOTAL
LANGLEY RESEARCH CENTER				
60.400.790	NAS1-7256-5-P	Langley Support	EJ	$ 26,351.00
		LANGLEY RESEARCH CENTER SUBTOTAL		$ 26,351.00
PRODUCTION SUPPORT (02-02)				
66.000.083	L-67506	Support for ESRO IB Scout	EK	$ 347,571.87
60.400.790	NAS1-7256-5-A	Program Management'	EJ	139,308.49
60.400.790	NAS1-7256-5-B	Payload Coordination	EJ	10,333.00
60.400.790	NAS1-7256-5-D	Data Reduction and Analysis	EK	2,428.13
60.400.790	NAS1-7256-5-N	VAFB Launch Services	EJ	9,261.00
60.900.046	NAS1-7256-18(M17)F	Quality Representative at UTC	EJ	1,655.00
60.400.790	NAS1-7256-18-A	Program Management	EJ	30,253.51
60.400.790	NAS1-7256-18-B	Payload Coordination	EJ	13,490.00
60.400.790	NAS1-7256-18-C	Preflight Planning	EJ	21,032.00
60.400.790	NAS1-7256-18-D	Data Reduction and Analysis	EJ	40,944.29
60.400.790	NAS1-7256-18-E	Systems Engineering	EJ	144,302.00
60.400.790	NAS1-7256-18-F	Reliability Program	EJ	98,732.00
60.400.790	NAS1-7256-18-G	Standardization & Config. Control	EJ	48,627.00
60.400.790	NAS1-7256-18-L	Logistics Support Management	EJ	33,161.00
60.400.790	NAS1-7256-18-W	Certification Training	EJ	2,118.00
60.900.055	NAS1-7256-21 N	50% VAFB Launch Serv.7/1/70-11/1/70	EJ	37,906.00
60.900.143	NAS1-7256-29-N	Tech. at WTR, Sept.-Oct 1970	EJ	1,252.00
60.900.088	NAS1-7256-30(M24)-G	Rev. Vol. III Rocket Motor Manual	EJ	2,185.00
	Suballotment GSFC		EJ	6,287.30
	Suballotment KSC		EJ	17,812.59
		PRODUCTION SUPPORT SUBTOTAL		$ 1,008,660.18
TRAVEL				
		Travel	EJ	$ 68,660.80
		TRAVEL SUBTOTAL		$ 68,660.80
		TOTAL -02 SUPPORTING ACTIVITIES EXPENDITURES		$ 1,103,671.98
		ESRO IB SPECIALS SUBTOTAL		$ 1,112,215.98
		TOTAL SPECIALS EXPENDITURES		$22,310,706.28

AWAITING FUNDS

P.R. NO.	ORDER NO.	ITEM	TOTAL
60.400.621	NAS1-5610-2	Balance on Procurement of 1 Scout Vehicle	$ 73,106.17
60.400.790	NAS1-7256-18-D	Data Reduction & Analysis Balance	23,607.85
		Travel (Completion of Prorated Share)	12,763.20
		Contract Incentive	106,250.00
		Headquarters Overhead	38,395.00
		Shipping (Completion of Prorated Share)	20,000.00
		DCASO	15,954.00
			$290,076.22

SECTION IV - EXPENDITURES BY FUNDS

The Scout Program was assigned Program 890 development funds in 1959. The development program (Phase I) was terminated in FY 1963. From 1964 through 1968 the 497 program was assigned to Scout. The Systems Engineering fund (497) was used for software, field support, supporting activities and program support. The 497 Scout Funding was finalized as follows:

1964	$3,400,000.00
1965	7,494,526.42
1966	3,999,904.00
1967	3,985,091.00
1968	4,962,661.35
TOTAL	$23,842,182.77

The 1964 and 1965 ($10,894,526.42) funds were for Phase III. The balance ($12,947,656.42) was for Phase IV.. Table LXXVI summarizes the 497 expenditures. The detailed Systems Engineering fund expenditures are itemized in tables LXXVII through LXXIX. In 1969 the 497 fund source was discontinued and the above listed activities were assigned as follows:

490-02	Supporting Activities
-02-01	Field Services
-02-02	Production Support
-02-03	Logistics
490-03	Major Product Improvement

In addition, the Trust Funds first received in 1964 from international users of Scouts were assigned the following:

490-04-00	Trust Funds
-04-01	ESRO-IB
-04-02	ESRO-IV
-04-08	AEROS-B
-04-10	San Marco (Also 894)
-04-16	UK-X4
-04-17	UK-6

Only the ESRO-IB and San Marco international programs are included in this publication. The funds were received in the form of Trust Funds and deposited by the Scout user into a Chase National Bank account.

The Scout Project Office with the NASA/DOD Coordination Committee (Appendix B) managed the Scout Program. The Scout procurement was

assigned the NASA agencywide coding designations as follows:

490-00-00	Scout Procurement
-01-01	Vehicle Hardware
-01-02	Motors
-01-03	Spares
-01-04	Mission Modifications
-01-05	Procurement

SYSTEMS ENGINEERING AND MAINTENANCE FUNDS

TABLE XLXXVI - SCOUT SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

	PHASE III	PHASE IV				PHASE V					
	FY 1964 & 1965	FY 1964	FY 1966	FY 1967	FY 1968	FY 1965	FY 1966	FY 1967	FY 1968	PLANNED	TOTAL
-01 HARDWARE	$ 125,663.00	$700.00	$ 18,858.00	$ 313,278.09	$1,166,621.48	$1,227,063.81		$ 31,586.40			$ 2,883,770.78
Vehicles	(1,736.00)	(700.00)	(0)	(290,926.17)	(981,759.91)	(1,227,063.81)		(31,586.40)			
Spares	(-1,736.00)		(0)	(0)	(22,925.00)						
Mission Mods (01-04)	(125,663.00)		(18,858.00)	(22,351.92)	(161,936.57)						
-02 SUPPORTING ACTIVITIES	$7,841,925.61		$3,747,381.93	$1,305,802.36	$1,021,517.86	$1,625,614.00	$169,691.95	$ 708,974.93	$2,815,151.93		$19,236,060.57
DCASO	(38,442)		(134,408.56)	(67,509.61)	(45,627.20)**						
FIELD SERVICES											
Langley Research Center	(15,288.31)		(469.77)	(2,106.42)	(3,771.36)						
Wallops Station	(297,917.00)		(418,041.89)	(24,176.22)	(20,386.51)						
Suballotment-WI	(124,520.00)		(59,954.00)	(19,994.00)	(71,120.35)						
Western Test Range	(879,405.73)		(52,721.61)	(7,373.39)	(20,970.03)						
Suballotment-WTR	(0)		(24,799.99)	(46,694.79)	(37,431.84)						
PRODUCTION SUPPORT	(6,466,344.73)		(3,056,969.43)	(1,136,616.68)	(795,106.82)	(1,625,614.00)	(169,691.95)	(708,974.93)	(2,815,151.93)		
Suballotment-GSFC	(20,007.78)		(0)	(0)	(0)	(0)					
SHIPPING (02)			(16.68)	(1,331.25)	(27,103.75)						
-03 PRODUCT IMPROVEMENT	$ 73,560.00		$ 39,972.12	$ 200,000.00	$ -107,360.47			$1,425,449.22		$126,730.55	$ 1,758,351.42
ALGOL NOZZLE	(73,560.00)		(39,972.12)		(256,097.53)			(7,968.25)			
FAILURE INVESTIGATION	(0)		(0)	(200,000.00)	(-363,458.00)			(51,000.00)			
FIFTH STAGE	(0)		(0)	(0)	(0)			(1,366,474.95)		(126,501.34)	
SHIPPING								(6.02)		(229.21)	
TOTALS	$8,041,148.61	$700.00	$3,806,212.05	$1,819,080.45	$2,080,778.87	$2,852,677.81	$169,691.95	$2,166,010.55	$2,815,151.93	$126,730.55	$23,878,182.77

**Includes 36K OSS Direct.

TABLE LXXVII - FY 1966 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
MISSION MODS (01-04)			
60.400.331	NAS1-3899-38	Flight E-Section, from T-24	$ 9,000.00
60 400.598	NAS1-3899-38-1	Mods. 2 E-Section Separation Sys.	9,858.00
		MISSION MODS SUBTOTAL	$ 18,858.00
		HARDWARE SUBTOTAL	$ 18,858.00
-02 SUPPORTING ACTIVITIES			
DCASO			
45.110.018	NAS1-1295(122)	DOD Plant Services	$ 139.32
01.030.020	NAS1-1481(269)	DOD Plant Services	320.00
45.110.051	NAS1-1481(101)	DOD Plant Services	160.00
45.110.018	NAS1-1928(122)	DOD Plant Services	97.53
01.030.020	NAS1-1928(219,267)	DOD Plant Services	1,578.40
45.110.018	NAS1-1928	DOD Plant Services	6.80
45.110.020	NAS1-1928	DOD Plant Services	1,999.16
01.030.020	NAS1-2215(278)	DOD Plant Services	160.00
45.110.020	NAS1-2215(278)	DOD Plant Services	80.00
01.030.020	NAS1-2455(279)	DOD Plant Services	320.00
45.110.020	NAS1-2455	DOD Plant Services	208.98
45.110.020	NAS1-2617	DOD Plant Services	90.56
01.030.020	NAS1-3589(68)	DOD Plant Services	20,161.43
45.110.018	NAS1-3589	DOD Plant Services	4,952.00
45.110.020	NAS1-3589	DOD Plant Services	10,700.22
01.030.020	NAS1-3615(274)	DOD Plant Services	160.00
45.110.020	NAS1-3615	DOD Plant Services	8,110.45
45.110.051	NAS1-3657(111)	DOD Plant Services	160.00
01.030.020	NAS1-3657(229,272)	DOD Plant Services	13,445.00
45.110.020	NAS1-3657(229)	DOD Plant Services	7,735.78
01.030.020	NAS1-3683(230)	DOD Plant Services	1,744.00
45.110.051	NAS1-3899(106,107)	DOD Plant Services	784.00
01.030.020	NAS1-3899(157)	DOD Plant Services	22,251.61
45.110.018	NAS1-3899(158)	DOD Plant Services	-305.20
01.030.020	NAS1-3899(158)	DOD Plant Services	2,661.26
45.110.018	NAS1-3899	DOD Plant Services	3,264.00
45.110.020	NAS1-3899	DOD Plant Services	2,516.49
01.030.020	NAS1-4325(71,156)	DOD Plant Services	2,572.00
45.110.051	NAS1-4325(109)	DOD Plant Services	160.00

TABLE LXXVII Continued - FY 1966 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
DCASO Continued			
45.110.018	NAS1-4325(122)	DOD Plant Services	$ 1,874.94
45.110.020	NAS1-4325	DOD Plant Services	4,968.98
45.110.020	NAS1-4664(85)	DOD Plant Services	794.41
45.110.051	NAS1-4664(85)	DOD Plant Services	60.00
01.030.020	NAS1-4794(177)	DOD Plant Services	625.60
45.110.051	NAS1-4794(220)	DOD Plant Services	665.20
01.030.020	NAS1-4795(176)	DOD Plant Services	8,480.00
45.110.051	NAS1-4795(222)	DOD Plant Services	5,915.00
45.110.020	NAS1-4795	DOD Plant Services	23.22
45.110.051	NAS1-5592(96,97)	DOD Plant Services	3,720.00
01.030.020	NAS1-5592(280,281)	DOD Plant Services	976.00
01.030.020	NAS5-61(215)	DOD Plant Services	30.62
45.110.020	NAS5-61	DOD Plant Services	40.80
		DCASO SUBTOTAL	$ 134,408.56
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER (RAS120)			
ADB100	L-15974	Stock Issues	$ 31.68
50.050.878	L-79872	Frames	112.80
53.340.425	L-82028	Galv. Wire	54.29
50.050.929	L-83647	Painting Scout	200.00
60.400.249	NAS1-4781(61)	Static Firing, Algol IIB-23	35.50
60.400.249	NAS1-4781	Preparing Display Vehicle	35.50
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 469.77
WALLOPS STATION (RAS136, RAS161)			
ADB100	L-15974	Stock Issues	$ 1,469.44
53.520.261	L-19110	Crystal, Liquid	74.73
53.520.335	L-19647	Lettering Systems	57.02
60.400.593	L-44472	4 Sta. Switching Sys. Location	8,220.46
60.400.441	L-61716	Gasoline	4.20
60.400.501	L-61716	Temp. Gage Records	47.50
01.030.026	L-71216-15	Algol Handling Rings	2,500.00
01.030.024	L-71235-29	Orifice Plates	99.50
60.400.444	L-73135	Paint for Blast Shield	6.50
60.400.065	L-75307	Chartered Airplane	38.00
53.320.414	L-75815	Chemical Coating, Battery Boxes	38.80

TABLE LXXVII CONTINUED- FY 1966 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01) Continued			
WALLOPS STATION (RAS136, RAS161) Continued			
60.400.483	L-75918	Hose, Stainless Steel	$ 294.46
60.400.488	L-77093	M.G. Set	919.59
01.030.031	L-80285-6	Castor Clamps	99.99
01.030.038	L-83189-8	Handling Rings	400.00
53.320.557	L-84783	Multiple-Range Voltmeter	349.00
53.520.247	80330180960-071	Perforator, Paper	4.90
60.400.352	NAS1-3899-41	Mod. Kits, Transporter	26,596.80
60.400.420	NAS1-3899-41	Mod. Kits, Transporter	30,797.00
60.400.352	NAS1-3899-41-1	Mod. Kits, Transporter	-607.00
60.400.570	NAS1-4664-13	Scout Transporter Mods.	6,000.00
60.400.588	NAS1-4664-13	Scout Transporter Mods.	3,044.00
60.400.568	NAS1-4664-15	New GSE	6,649.00
60.400.199	NAS1-4664-K	Logistics Support	330,938.00
	Suballotment Wallops		59,954.00
		WALLOPS STATION SUBTOTAL	$ 477,995.89
WESTERN TEST RANGE (RAS137)			
60.010.001	L-2558-468	WTR Small Purchases	$ 66.54
60.010.002	L-2558-661	WTR Small Purchases	18,627.40
50.050.948	L-61746-46	Heat Treat Rings	135.91
53.110.482	L-73497	Steel, 8 Pieces	2,302.29
60.400.494	L-78896	Cable	729.60
60.400.528	L-79464	Voltmeter	1,736.68
53.320.557	L-84783	Multiple-Range Voltmeter	1,276.00
60.400.613	L-90030	M.G. Set	983.00
20.200.608	NAS1-2617	WTR Emergency Support	2,092.19
60.400.568	NAS1-4664-15	New GSE	22,644.00
20.200.717	NAS1-4795-1	3 X-258 Handling Fixtures	2,128.00
	Suballotment WTR		24,799.99
		WESTERN TEST RANGE SUBTOTAL	$ 77,521.60
PRODUCTION SUPPORT (RAS138, RAS163) (02-02)			
20.200.190	L-15993-1	Castor II Increase	$ 422.75
60.400.524	L-61716	Recording Thermometer	46.54

TABLE LXXVII Continued - FY 1966 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
PRODUCTION SUPPORT (RAS138, RAS163) (02-02) Continued			
55.310.198	L-65692	Scout Velocity Package	$ 6.09
60.400.377	L-68822	Air Transport Demonstration, S-131R	4,481.00
60.400.450	L-74164	Air Transport of Vehicle S-139	11,664.00
60.400.468	L-75981	X-ray X-259 Nozzle	237.98
60.400.552	L-81206	Air Transport of S-145, S-146	13,685.60
60.400.552	L-81206-1	Air Transport of S-145, S-146	-7,000.00
60.400.574	L-83235	Stainless Steel	60.76
60.400.559	L-84992	Radar Antenna, D-Section	651.00
60.400.586	L-85662	Captive Nut Hi-Shear Mod. S/N 7313-2	1,694.25
60.400.587	L-85662	Hi-Shear No. PC33	803.25
53.320.529	L-85763	Digital Voltmeter	1,180.00
54.010.009	L-86082	Stainless Steel Fitting	34.25
53.340.476	L-89501	Scout Antenna Tests	82.80
60.400.605	L-90295	Air Transport of S-150	4,811.10
50.050.122	L-92207	Construct. Antenna Model Stand	202.10
60.400.376	NAS1-1330-15	Tensile Test, Algol II Nozzle Insul.	301.00
60.400.448	NAS1-3493-4(c7)	X-259 Igniter Redesign, Phase I	9,000.00
60.400.449	NAS1-3493-4(c7)	X-259 Igniter Redesign, Phase II	35,000.00
60.400.452	NAS1-3493-4(c7)	X-259 Design, Phase I	6,000.00
60.400.460	NAS1-3493-4(c7)	X-259 Igniter Redesign, Phase II	35,000.00
60.400.578	NAS1-3493-4(c7)	X-259 Igniter Mods.	6,067.00
60.400.520	NAS1-3493-6(c8)	Test Prog., Modified X-259 Igniter	4,322.00
	NAS1-3515	Maintenance and GSE at LRC	55,000.00
60.400.432	NAS1-3698-9	Shipment Fired X-258 Nozzle	46.00
60.400.505	NAS1-3698-10	Postfiring Eval. X-258 RH-100	4,077.00
60.400.582	NAS1-3698-11(c25)	Igniter Mods.	108,586.00
60.400.503	NAS1-3698-11(c30)	Firing SD60A1 Initiators	4,066.00
60.400.609	NAS1-3698-13	Static Test, X-258 RH-111	17,046.00
60.400.546	NAS1-3698-13(c34)	X-258 Rocket Motor	6,500.00
60.400.560	NAS1-3698-13(c34)	Static Test, X-258 RH-111	2,000.00
60.400.415	NAS1-3698(c25A)	Redesign X-258 Igniters	5,276.52
60.400.454	NAS1-3833-3	NDT Specs., Algol IIB	3,520.00
60.400.535	NAS1-3899-34-2	Rev. Scout User's Manual	1,012.00
60.400.418	NAS1-3899-42	Tests, EX-38 Cartridges	1,500.00
60.400.470	NAS1-3899-42	Accept. Test, EX-38 Cartridges	2,776.00
60.400.385	NAS1-3899-46	Central Ord. Complex Study	30,000.00
60.400.498	NAS1-3899-46	Central Ordnance Study	9,436.00
60.400.045	NAS1-4437	Castor I Flight Nozzles	32.52
60.400.199	NAS1-4664-5-E	Support Services for Phase IV	795,622.32
60.400.438	NAS1-4664-6	E-Section Instrumentation	90,764.00
60.400.556	NAS1-4664-12-H	Scout Standard Operating Procedures	23,751.00

TABLE LXXVII Continued - FY 1966 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
PRODUCTION SUPPORT (RAS138, RAS163) (02-02) Continued			
60.400.199	NAS1-4664-E	Support Services for Phase IV	$ 39,415.40
60.400.339	NAS1-4793-2	Thiokol Sup. for Castor II Load Test	2,141.00
60.400.477	NAS1-4793-3	Repair Castor Shipping Container	1,628.00
60.400.497	NAS1-4793-5	Leak Flow Anal., Castor II Nozzle	5,000.00
60.400.525	NAS1-4793-5	Castor II Nozzle Flow Analysis	1,000.00
60.400.551	NAS1-4793-5	Castor II Nozzle Flow Analysis	1,128.00
60.400.509	NAS1-4794-5	Algol II Sustaining Engineering	13,304.78
60.400.475	NAS1-4795-2	HPC Sustaining Engineering	62,329.00
60.400.397	NAS1-4795-4	Installation of Tunnel Tabs	3,827.00
60.400.403	NAS1-4795-5	X-258 and X-259 Dwg. and Doc. Review	9,000.00
60.400.495	NAS1-4795-5	X-258 Drawing and Document Review	4,863.00
60.400.476	NAS1-5034-2(c3)	Castor IIA Noz. Entrance Insulator	630.00
60.400.596	NAS1-5592-1	Lightweight Beacon Study	8,543.00
60.400.561	NAS1-5592-3	C/D Receiver and T/M Transmitter	40,000.00
60.400.614	NAS1-5592-3	C/D Receiver and T/M Transmitter	7,012.00
60.400.445	NAS1-5592-4	Vehicle Vertical Alinement	-42,934.00
60.400.620	NAS1-5592-8(c3)	Batteries for E-Section Timers	12,366.00
60.400.445	NAS1-5592	R and D Product Improvement	250,000.00
60.400.499	NAS1-5592	R and D Product Improvement	116,926.00
60.400.557	NAS1-6020-3-A	Prime Contractor Management	79,111.90
60.400.704	NAS1-6020-6(c2)-H	Modification to EGSE	4,816.00
60.400.649	NAS1-6020-8-Ca1-L	E-Section T/M Batteries	37.51
60.400.744	NAS1-6020-17(c4)-G	Handling Proceds. for Mtr. Containers	2,400.00
60.400.799	NAS1-6020-17(c4)-G	Handling Proceds. for Mtr. Containers	9,134.00
60.400.784	NAS1-6020-17-Ca28-R	Repair Base A Section S-157	4,283.00
60.400.773	NAS1-6020-19-Ca41-S	Fourth-Stage Initiators	4,600.00
60.400.773	NAS1-6020-20-Ca55-L	Repl. Philosophy for Reac. Cont. Sys.	4,575.00
60.400.557	NAS1-6020-A	Prime Contractor Management	499,955.10
60.400.557	NAS1-6020-B	Payload	69,033.58
60.400.557	NAS1-6020-D	Data Analysis	153,696.60
60.400.557	NAS1-6020-E	Systems Engineering	243,900.24
60.400.557	NAS1-6020-F	Reliability	32,399.82
60.400.557	NAS1-6020-G	Standardization	123,082.67
		PRODUCTION SUPPORT SUBTOTAL	$3,056,969.43
SHIPPING			
	NAS1-3698	Hercules Shipping	$ 16.68
		SHIPPING SUBTOTAL	$ 16.68
		SUPPORTING ACTIVITIES SUBTOTAL	$3,747,381.93

TABLE LXXVII Concluded - FY 1966 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-03 PRODUCT IMPROVEMENT			
ALGOL NOZZLE			
60.400.835	NAS1-6020-30-Ca51-R	Algol IIB X-ray and Mod. Program	$ 37,940.47
60.400.845	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Insert	2,031.65
		ALGOL NOZZLE SUBTOTAL	$ 39,972.12
		PRODUCT IMPROVEMENT SUBTOTAL	$ 39,972.12
		PHASE IV SUBTOTAL	$3,806,212.05
PHASE V			
-02 SUPPORTING ACTIVITIES			
60.400.557	NAS1-6020-B	Payload	$ 47,230.00
60.400.557	NAS1-6020-C	Preflight Planning	61,591.00
60.400.557	NAS1-6020-D	Data Analysis	662.74
60.400.557	NAS1-6020-E	Systems Engineering	42,454.99
60.400.557	NAS1-6020-F	Reliability	5,380.00
60.400.931	NAS1-10000-E	Systems Engineering	12,373.22
		PRODUCTION SUPPORT SUBTOTAL	$ 169,691.95
		SUPPORTING ACTIVITIES SUBTOTAL	$ 169,691.95
		PHASE V SUBTOTAL	$ 169,691.95
PHASE VI			
-03 PRODUCT IMPROVEMENT			
FIFTH STAGE			
62.510.055	NAS1-7102	BE-3-A9 Motors	$ 24,000.00
		FIFTH STAGE SUBTOTAL	$ 24,000.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ 24,000.00
		PHASE VI SUBTOTAL	$ 24,000.00
		FY 1966 TOTAL	$3,999,904.00
		01 TOTAL	$ 18,858.00
		02 TOTAL	$3,917,073.88
		03 TOTAL	$ 63,972.12

TABLE LXXVIII - FY 1967 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.557	NAS1-6020-J	Vehicle Mod. Checkout	$ 188,586.78
60.400.557	NAS1-6020-K	Vehicle Checkout	102,339.39
		VEHICLE SUBTOTAL	$ 290,926.17
		HARDWARE SUBTOTAL	$ 290,926.17
-02 SUPPORTING ACTIVITIES			
DCASO			
01.030.020	NAS1-553(487)	DOD Plant Services	$ 409.77
45.110.051	NAS1-1928(103)	DOD Plant Services	480.00
01.030.020	NAS1-3589(68)	DOD Plant Services	112.00
45.110.051	NAS1-4664(85)	DOD Plant Services	61,304.00
01.030.020	NAS1-4795(176)	DOD Plant Services	647.84
45.110.051	NAS1-5592(96)	DOD Plant Services	3,732.00
45.110.051	NAS1-6935(620,621)	DOD Plant Services	824.00
		DCASO SUBTOTAL	$ 67,509.61
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER (RAS120)			
62.510.222	L-7910	Wire	$ 105.45
62.510.226	L-8176	Hydraulic Hose Equipment	119.82
54.010.735	L-8576	Heater Elements	154.52
ADB100	L-15974	Stock Issues	1,726.63
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 2,106.42
WALLOPS STATION (RAS146, RAS161)			
60.400.694	L-599	Diode	$ 29.93
53.340.537	L-1208	Measuring Machine	9.60
53.320.696	L-1975	Plate	35.62
51.250.203	L-2004	Measuring Machine	211.68
60.400.698	L-2500	Screws, FW-4S Motor Refurbishment	78.05
51.250.207	L-2936	Measuring Machine	21.14

TABLE LXXVIII Continued - FY 1967 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01) Continued			
WALLOPS STATION (RAS146, RAS161) Continued			
53.330.824	L-3974	Measuring Machine	$ 16.36
53.340.555	L-4144	Measuring Machine	357.35
60.400.743	L-11204	Slide Trays	23.52
ADB100	L-15974	Stock Issues	4,626.76
53.520.184	L-19148	Binders, Loose Leaf	267.25
60.400.593	L-44472	4 Sta. on Switching Sys. Location	10,451.92
53.510.990	L-85087-121	Cable	24.40
01.030.052	L-96074-10	Tool Services	230.00
01.030.060	L-98432-14	Measuring Machine	258.70
50.050.768	L-98938	Measuring Machine	233.24
01.030.068	L-4-53120-592	FW-4S Shipping Containers	420.00
01.030.063	L-4-54110-359	Tool Services	480.00
60.400.625	NAS1-6020-2-J	Mod. Kits for Switching Relays	6,287.00
	NAS1-6133	Rigging and Hauling	113.70
	Suballotment Wallops		19,994.00
		WALLOPS STATION SUBTOTAL	$ 44,170.22
WESTERN TEST RANGE (RAS147, RAS162)			
60.400.671	L-44472	Datafax Switch System	$ 2,335.49
60.400.676	NAS1-6020-2-N	AFWTR Training	5,000.00
	NAS1-6133	Move Pump at QASS	37.90
	Suballotment WTR		46,694.79
		WESTERN TEST RANGE SUBTOTAL	$ 54,068.18
PRODUCTION SUPPORT (RAS148, RAS149, RAS163, RAS164) (02-02)			
60.400.720	L-4898	Velostat Film for FW-4S	$ 117.67
ADB100	L-15974	Stock Issues	151.71
60.400.753	L-84999	X-259 Test at NORD	15,000.00
53.320.640	L-94090	Scout Ignition Battery Simulator	87.49
53.320.652	L-95588	Diodes	41.50
60.400.670	L-97465	Air Transport, S-155	7,000.00
60.400.734	L-97465	Air Transport, Scout Vehicle	9,065.00

TABLE LXXVIII Continued - FY 1967 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

PHASE IV Continued

-02 SUPPORTING ACTIVITIES Continued

PRODUCTION SUPPORT (RAS148, RAS149, RAS163, RAS164)(02-02) Continued

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
60.400.673	NAS1-4794-9	Mods., Algol Handling Dollies	$ 1,550.00
60.400.685	NAS1-4794-10	Algol IIB Test	4,502.00
60.400.630	NAS1-4795-2-1	X-258, X-259 Motors Sust. Engrg.	22,460.00
60.400.636	NAS1-4795-2-1	X-258, X-259 Motors Sust. Engrg.	9,288.00
60.400.629	NAS1-4795-10	X-258 and X-259 Technical Support	8,804.00
60.400.678	NAS1-4795-10-1	X-258 and X-259 Technical Support	58,955.00
60.400.709	NAS1-4795-10-2	X-258 and X-259 Technical Support	37,000.00
60.400.730	NAS1-4795-10-2	X-258 and X-259 Technical Support	16,577.00
60.400.644	NAS1-5592-9	34-inch Heat Shield	3,430.00
60.400.561	NAS1-5592-10	Receiver and Transmitter	-10,918.00
60.400.701	NAS1-5883-2	Rework X-259 Shipping Containers	527.00
60.400.652	NAS1-5883-6(c5)	Tests, FW-4S Motor Nozzle Inserts	16,000.00
60.400.731	NAS1-5883-7(c13)	Burst Tests, FW-4S Motor Case	33,000.00
60.400.693	NAS1-6020-2-J	Deutsch Connectors	4,476.00
60.400.691	NAS1-6020-2-N	Optical Equipment	1,239.00
60.400.557	NAS1-6020-3-F	Reliability	55,952.60
60.400.703	NAS1-6020-4-H	Autodestruct Rework to EGSE and MGSE	8,667.00
60.400.702	NAS1-6020-6(c1)-G	Rev. Standard Procedures	1,132.00
60.400.740	NAS1-6020-7-E	X-258 Motor System Engineering	51,572.72
60.400.750	NAS1-6020-10-E	Qual. Cont. Rep. at UTC (FW-4S Vendor)	129.15
60.400.557	NAS1-6020-A	Prime Contract Management	5,572.81
60.400.557	NAS1-6020-C	Preflight Planning	85,362.61
60.400.557	NAS1-6020-D	Data Analysis	85,887.40
60.400.557	NAS1-6020-E	Systems Engineering	243,840.26
60.400.557	NAS1-6020-F	Reliability	2,876.50
60.400.557	NAS1-6020-G	Standardization	977.07
60.400.557	NAS1-6020-J	Vehicle Mod. Checkout	88,196.39
60.400.557	NAS1-6020-L	Logistics	121,590.00
60.400.557	NAS1-6020-P	LRC Field Support	111,534.00
	NAS1-6133	Rigging and Hauling	75.80
60.400.696	NAS1-6935-2	Shock Spectrum Plots	3,300.00
60.400.707	NAS1-7314	X-258 Nozzle Retainer Ring Molding	15,000.00
60.400.714	NAS1-7314	X-258 Retainer Ring Molding	10,000.00
60.400.717	NAS1-7314	X-258 Retainer Ring Molding	6,597.00
		PRODUCTION SUPPORT SUBTOTAL	$1,136,616.68

TABLE LXXVIII Continued - FY 1967 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
SHIPPING			
	NAS1-3698	Hercules Shipping	$ 464.95
	NAS1-6020	LTV Shipping	866.30
		SHIPPING SUBTOTAL	$ 1,331.25
		SUPPORTING ACTIVITIES SUBTOTAL	$1,305,802.36
-03 PRODUCT IMPROVEMENT			
FAILURE INVESTIGATION			
60.400.742	NAS1-6020-13-Ca15-R	S-152 Failure Investigation	$ 200,000.00
		FAILURE INVESTIGATION SUBTOTAL	$ 200,000.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ 200,000.00
		PHASE IV SUBTOTAL	$1,796,728.53
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.656	NAS1-5610-7(c3)	Convert to S.S. Tubes	$ 2,266.00
60.400.557	NAS1-6020-J	Vehicle Mod. Checkout	29,320.40
		VEHICLES SUBTOTAL	$ 31,586.40
MISSION MODS (01-04)			
60.400.401	NAS1-3899-44	4 E-Section Sep. Sys. for Test	$ 12,000.00
60.400.493	NAS1-3899-44	4 E-Section Sep. Sys. for Test	8,412.00
60.400.649	NAS1-6020-8-Cal-L	E-Section T/M Batteries	1,939.92
		MISSION MODS SUBTOTAL	$ 22,351.92
		HARDWARE SUBTOTAL	$ 53,938.32

TABLE LXXVIII Concluded - FY 1967 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.656	NAS1-5610-7(c3)	FW-4S Nozzle Inserts	$ 20,734.00
60.400.557	NAS1-6020-A	Prime Contract Management	414,189.00
60.400.557	NAS1-6020-E	Systems Engineering	180,959.35
60.400.557	NAS1-6020-F	Reliability	2,876.50
60.400.557	NAS1-6020-L	Logistics	16,661.08
60.400.557	NAS1-6020-P	LRC Field Support	73,555.00
		PRODUCTION SUPPORT SUBTOTAL	$ 708,974.93
		SUPPORTING ACTIVITIES SUBTOTAL	$ 708,974.93
-03 PRODUCT IMPROVEMENT			
ALGOL NOZZLE			
60.400.845	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Insert	$ 7,968.25
		ALGOL NOZZLE SUBTOTAL	$ 7,968.25
FAILURE INVESTIGATION			
60.400.747	NAS1-6020-13-Ca16-R	X-259 Tests and Analyses on S-152	$ 51,000.00
		FAILURE INVESTIGATION SUBTOTAL	$ 51,000.00
FIFTH STAGE			
62.510.186	L-5009	BE-3 Casting Powder	$ 1,166.00
60.400.667	NAS1-5592-9	Eval. Heat Shield for Sunblazer P/L	10,000.00
60.400.865	NAS1-6868-9(M4)	Backup Signal Conditioners	33.95
60.400.633	NAS1-6868	Fifth-Stage Velocity Package	1,000,000.00
60.400.728	NAS1-6868	Fifth-Stage Velocity Package	158,275.00
62.510.055	NAS1-7102	BE-3A-9 Motors	197,000.00
		FIFTH STAGE SUBTOTAL	$1,366,474.95
SHIPPING			
	NAS1-6868	LTV Shipping	$ 6.02
		SHIPPING SUBTOTAL	$ 6.02
		PRODUCT IMPROVEMENT SUBTOTAL	$1,425,449.22
		PHASE V SUBTOTAL	$2,188,362.47
		FY 1967 TOTAL	$3,985,091.00
		01 TOTAL	$ 344,864.49
		02 TOTAL	$2,014,777.29
		03 TOTAL	$1,625,449.22

TABLE LXXIX - FY 1968 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.557	NAS1-6020-9-J	Vehicle Mod. Checkout	$ 981,577.22
60.400.898	NAS1-6020-31-J	Vehicle Mod. Checkout	182.69
		VEHICLES SUBTOTAL	$ 981,759.91
SPARES (01-03)			
60.400.773	NAS1-6020-20-Ca52-L	Procurement of Miscellaneous Spares	$ 1,700.00
60.400.773	NAS1-6020-20-Ca53-L	Procurement of Miscellaneous Spares	17,000.00
60.400.773	NAS1-6020-20-Ca55-L	Replacmt. Philosophy React.Cont.Sys.	4,225.00
		SPARES SUBTOTAL	$ 22,925.00
MISSION MODS (01-04)			
60.400.764	NAS1-3899-38-2	E-Section Suitcase Checkers	$ 1,048.00
60.400.763	NAS1-3899-44-1	4 E-Section Separation Systems	522.00
60.400.649	NAS1-6020-8-Cal-L	E-Section T/M Batteries	5,222.57
60.400.752	NAS1-6935-11	6 Test and 6 Flt. E-Sect. Sep. Sys.	65,000.00
60.400.808	NAS1-6935-11	4 Test E-Sections and 12 Timers	90,144.00
		MISSION MODS SUBTOTAL	$ 161,936.57
		HARDWARE SUBTOTAL	$1,166,621.48
-02 SUPPORTING ACTIVITIES			
DCASO			
01.030.020	NAS1-1928(267)	DOD Plant Services	$ 791.60
45.110.051	NAS1-4325(109)	DOD Plant Services	56.00
45.110.051	NAS1-4664(84,85)	DOD Plant Services	5,584.00
45.110.051	NAS1-5592(96)	DOD Plant Services	2,808.00
01.030.020	NAS1-6076(487)	DOD Plant Services	251.60
45.110.051	NAS1-7102(732)	DOD Plant Services	136.00
OSS	DIRECT DCASO	DOD Plant Services	36,000.00
OSS	DIRECT DCASO	Half Costs Paid by Navy	-18,000.00
		DCASO SUBTOTAL	$ 27,627.20

TABLE LXXIX Continued - FY 1968 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER (RAS120, RAS175)			
12.720.846	L-10241	Replacement Items for HPTA Systems	$ 839.95
12.720.846	L-10242	Replacement Items for HPTA Systems	157.00
12.720.846	L-10243	Replacement Items for HPTA Systems	1,700.00
ADB100	L-15974	Stock Issues	883.03
56.250.013	L-2156250013	Gears, Bearings, Screws, etc.	76.18
	NAS1-6133	Rigging and Hauling	115.20
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 3,771.36
WALLOPS STATION (RAS161, RAS171)			
	L-3172	Stock Issues	$ 2.75
53.320.744	L-7273	Connectors	1,004.00
50.050.341	L-8750	Cleaning Shipping Containers	164.00
04.030.572	L-13577	Subscription-LRC	25.00
ADB100	L-15974	Stock Issues	839.59
60.400.805	L-16792	Pak for Punching-Binding Machine	30.00
60.400.849	L-22101	Connecting Aid, S-163 and Sub.	426.98
42.060.748	L-23592	Record-O-Phone for REMO	545.00
60.400.723	L-44472	4-Station Switch. Sys. Location	10,000.00
60.400.801	L-44472	Moving Datafax at Dallas	350.00
60.400.802	L-44472	4-Station Switch. Sys. Location	6,654.44
01.030.075	L-0853110139	Shroud Locking Tools	129.35
53.320.757	L-3153320757	Diodes	215.40
	Suballotment Wallops		71,120.35
		WALLOPS STATION SUBTOTAL	$ 91,506.86
WESTERN TEST RANGE (RAS162, RAS172)			
53.330.058	L-15404	Grease Replacement	$ 17.79
ADB100	L-15974	Stock Issues	673.29
51.250.503	L-16060	1 Motor, Machine Shop	98.98
01.030.074	L-0253110094	Spin Tables	2,388.00
01.030.075	L-0253110252	Shroud Locking Tools	1,189.02
01.030.078	L-0253110338	Spin Tables	696.50
01.030.092	L-0352220876	Adapter Plate for Shaker Table	360.00
53.340.638	L-1153340638	Ball Bearings	882.00
60.400.811	NAS1-4794-9-2	Tire Replacement, Algol Handling Dollies	1,100.00
	NAS1-6133	Rigging and Hauling	212.40
60.010.005	NAS1-8043	Dynamic Balancing Facility	13,346.00
	NAS1-8043	Gisholt Shipping	6.05
	Suballotment WTR		37,431.84
		WESTERN TEST RANGE SUBTOTAL	$ 58,401.87

TABLE LXXIX - Continued - FY 1968 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
PRODUCTION SUPPORT (RAS148, RAS149, RAS163, RAS164, RAS173, RAS174) (02-02)			
ADB100	L-15974	Stock Issues	$ 465.66
01.030.088	L-23082	Wind Tunnel Scout E Model	537.40
56.250.006	L-24107	Fin Effectiveness Test Motor	540.80
01.030.069	L-84999	X-259 Motor Test at NORD	13,800.00
60.400.761	L-84999	X-259 Motor Test at NORD	8,700.00
01.030.069	L-0453120709	Guide Pin Set Assembly Fit Check	875.00
01.030.078	L-0853110371	Spin Tables	177.11
60.400.961	NAS1-3657-8	Completion of Contract	5,117.00
60.400.719	NAS1-4795-2-3	Final Overhead Title Rates Adjustment	5,061.00
60.400.780	NAS1-5592-13	Overrun	22,783.00
60.400.557	NAS1-6020-7-E	Systems Engineering	40,642.28
60.400.557	NAS1-6020-9-A	Prime Contractor Management	36,657.19
60.400.557	NAS1-6020-9-E	Systems Engineering	250,000.00
60.400.557	NAS1-6020-9-F	Reliability	115,381.88
60.400.557	NAS1-6020-9-L	Logistics	2,604.00
60.400.750	NAS1-6020-10-E	Qual. Control Rep. at UTC (FW-4S Vendor)	28,670.85
60.400.789	NAS1-6020-15-Ca32-R	Replacement, Scout Veh. Components	18,497.00
60.400.675	NAS1-6020-16-Ca18-S	Emergency Propulsion Sys. Support	4,500.00
60.400.675	NAS1-6020-16-Ca20-S	Prep. Algol IIB, S/N 17, for Shipment	1,000.00
60.400.675	NAS1-6020-16-Ca21-S	Qual. Test, X-258-E6, RH-130	25,000.00
60.400.675	NAS1-6020-16-Ca23-S	Initiator Development Program	12,000.00
60.400.675	NAS1-6020-16-Ca30-S	Emergency Propulsion Sys. Support	1,000.00
60.400.773	NAS1-6020-16-Ca31-S	Replacing Algol II Nozzle on S-157	3,325.00
60.400.675	NAS1-6020-16-Ca35-S	Machining of X-259 Nozzles	7,500.00
60.400.675	NAS1-6020-16-Ca38-S	Explosive Bolts, Ext. Shelf Life	330.00
60.400.675	NAS1-6020-16-Ca39-S	Rework Castor IIA Motor Tool	2,110.00
60.400.773	NAS1-6020-19-Ca36-S	Preparation of X-259 Chamber for Shipment	700.00
60.400.675	NAS1-6020-19-Ca37-S	X-258 Aging Program	5,473.00
60.400.773	NAS1-6020-19-Ca37-S	X-258 Aging Program	26,940.00
60.400.773	NAS1-6020-19-Ca45-S	9 Batch Test Motors	3,600.00
60.400.773	NAS1-6020-19-Ca47-S	Instrumentation, FW-4S Rocket Motor	13,200.00
60.400.773	NAS1-6020-19-Ca49-S	Rework Algol IIB-55 Igniter Sleeve	2,350.00
60.400.773	NAS1-6020-19-Ca56-S	Fab. Aft Insulation Mold for X-259 Motor	12,000.00
60.400.773	NAS1-6020-19-Ca57-S	X-ray of Castor Nozzle	1,100.00
60.400.815	NAS1-6020-24(c7)-K	Instrumentation for S-161	16,500.00
60.400.860	NAS1-6020-29(M23)-K	Ext. Shelf Life, EX-38 Press. Cr[illegible]dgs.	1,486.15
60.400.714	NAS1-6020-E	Systems Engineering	63,840.22
60.400.740	NAS1-6020-E	Systems Engineering	31,253.28
60.400.557	NAS1-6020-F	Reliability	9,389.00
		PRODUCTION SUPPORT SUBTOTAL	$ 806,971.52

TABLE LXXIX Continued - FY 1968 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
SHIPPING			
	NAS1-3493	Hercules Shipping	$ 15.65
	NAS1-3698	Hercules Shipping	27.49
	NAS1-4325	LTV Shipping	670.34
	NAS1-5592	LTV Shipping	11.45
	NAS1-5610	LTV Shipping	6,334.00
	NAS1-5880	LTV Shipping	637.50
	NAS1-5883	LTV Shipping	3,388.11
	NAS1-6020	LTV Shipping	11,693.70
	NAS1-6935	LTV Shipping	6.15
		SHIPPING SUBTOTAL	$ 22,784.39
		SUPPORTING ACTIVITIES SUBTOTAL	$ 999,198.50
-03 PRODUCT IMPROVEMENT (RAS149, RAS164, RAS173)			
ALGOL NOZZLE			
60.400.675	NAS1-6020-16-Ca34-S	Rework Algol IIB, S/N 55, S-160C	$ 2,500.00
60.400.821	NAS1-6020-30-Ca51-R	S-160C Flight Anomaly Investigation	107,838.00
60.400.823	NAS1-6020-30-Ca51-R	S-160C Flt. Anom.Therm.& Stress Anal.	30,000.00
60.400.828	NAS1-6020-30-Ca51-R	S-160C Flt. Anom. Invest.,Ext.Insul.	26,000.00
60.400.835	NAS1-6020-30-Ca51-R	Algol IIB X-ray and Mod. Program	67,059.53
60.400.836	NAS1-6020-30-Ca51-R	Dissection of Algol IIB Nozzles	20,000.00
60.400.773	NAS1-6020-35-Ca61-S	Radiography, Algol Nozzle	2,700.00
		ALGOL NOZZLE SUBTOTAL	$ 256,097.53
FAILURE INVESTIGATION			
60.400.557	NAS1-6020-12-E	Incentive Penalty for S-152C	$ -375,000.00
60.400.747	NAS1-6020-13-Ca16-R	X-259 Tests, S-152C	11,542.00
		FAILURE INVESTIGATION SUBTOTAL	$ -363,458.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ -107,360.47
		PHASE IV SUBTOTAL	$2,058,459.51

TABLE LXXIX Concluded - FY 1968 SYSTEMS ENGINEERING AND MAINTENANCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V			
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.656	NAS1-5610-7(c3)	Tests FW-4S Nozzle Inserts	$ 696.00
60.400.809	NAS1-5610-10(c17)	Rough Road Test FW-4S Mtr.Shp.Ctr.	10,500.00
60.400.870	NAS1-5610-10(c17)	Rough Road Test FW-4S Mtr.Shp.Ctr.	360.46
60.400.754	NAS1-5883-6(c5)	Mod. FW-4S Nozzles	2,712.00
60.400.754	NAS1-5883-6(c9)	Mods. FW-4S Nozzles	174,380.00
60.400.557	NAS1-6020-9-E	Systems Engineering	121,672.41
60.400.557	NAS1-6020-9-F	Reliability	209,643.02
60.400.675	NAS1-6020-19-Ca37-S	X-258 Aging Program	45,587.00
60.400.765	NAS1-6935-12	EX-38 Cartridges for H/S Sep. Sys.	35,000.00
60.400.814	NAS1-6935-12	Dev. and Qual. EX-38 Cartridges	18,587.00
60.400.790	NAS1-7256-5-A	Program Management	5,895.83
60.400.790	NAS1-7256-A	Program Management	777,936.88
60.400.790	NAS1-7256-E	Systems Engineering	1,389,000.00
60.400.790	NAS1-7256-X	Documentary Film	23,000.00
60.900.118	NAS1-10482	Tec. Support by Thiokol	181.33
		PRODUCTION SUPPORT SUBTOTAL	$2,815,151.93
SHIPPING			
	NAS1-5610	LTV Shipping	$ 308.29
	NAS1-5883	LTV Shipping	3,000.00
	NAS1-6935	LTV Shipping	1,011.07
		SHIPPING SUBTOTAL	$ 4,319.36
		SUPPORTING ACTIVITIES SUBTOTAL	$2,819,471.29
		PHASE V SUBTOTAL	$2,819,471.29
PHASE VI			
-03 PRODUCT IMPROVEMENT (RAS149, RAS164, RAS173)			
FIFTH STAGE (RAS157)			
ADB100	L-15974	Stock Issues	$ 176.34
60.400.865	NAS1-6868-9(M4)	Backup Signal Conditioners	450.00
60.400.777	NAS1-7102-1(c1)	Mods. to BE-3-A9 Rocket Motor Design	101,875.00
		FIFTH STAGE SUBTOTAL	$ 102,501.34
SHIPPING			
	NAS1-6020	LTV Shipping	$ 11.50
	NAS1-6868	LTV Shipping	171.23
	NAS1-7102	Hercules Shipping	46.48
		SHIPPING SUBTOTAL	$ 229.21
		PRODUCT IMPROVEMENT SUBTOTAL	$ 102,730.55
		PHASE VI SUBTOTAL	$ 102,730.55
		FY 1968 TOTAL	$4,980,661.35
		01 TOTAL	$1,166,621.48
		02 TOTAL	3,818,669.79
		03 TOTAL	-4,629.92

NASA PRODUCTION (490)

Table LXXX summarizes the -490 funds. The 490-Program expenditures for 1962 through 1971 are itemized in tables LXXXI through XCII. The details are presented only for Phases IV and V.

The Delta launch vehicle during this period was using the X-248 and X-258 motors. The Scout Project Office was selected to make the common purchaser of these motors and the funding provided by Delta to the Scout Project Office for this task is itemized in table XCIII.

In 1961 funding was received from the Navy to be used to purchase Scout vehicles for the Navy requirements of the NASA/DOD agreement. The funds for the first six Navy Scout vehicles are listed in the Phase II and III publication. The funds supplied for Phase IV is shown in table XCIV. In 1962 a decision was made by the Secretary of Defense to place the responsibility of all DOD space activity with the Air Force, therefore in 1962 funding for the Navy Scout vehicle program was transferred to the Air Force and these funds were received by the Scout Project Office on MIPR 63-29. Final costs for the first 13 Navy Scout vehicles are shown in table XCV. This group includes five Phase II Scout vehicles, one Phase III Scout vehicle, and 7 Phase IV Scout vehicles. Table XCV shows a total cost of $16,065,420.99 for this program which was funded as follows:

Direct by Navy	$8,200,000.00
By MIPR 63-29	7,460,198.99
By NASA credit for contractor Field Team effort	158,350.00
Balance funded in follow-on program (MIPR 66-95)	246,872.00
TOTAL	$16,065,420.99

Table XCV also shows the costs for each phase of the Scout Program. Detailed information for these phases and MIPR 63-29 is shown in tables XCV through C. The last funding year for MIPR 63-29 was 1966.

The Navy continued funding through the Air Force for Scout vehicles for the Navy Navigation satellite program. The program from 1967 through 1973 was funded on MIPR 66-95. This MIPR included two Phase IV and one Phase V Scouts. The Phase VI Scouts funded by this MIPR will be included in the next publication. Table CI through CV list the detailed expenditures of MIPR 66-95. The Navy data of the nine Scout vehicles of Phase IV and the one Scout vehicle of Phase V was included in tables LXIX through LXXV. The Air Force Scout Program required 11 Scout vehicles. Four were purchased direct by the Air Force from LTV, 1 on Phase III, and 6 on Phase IV. The four direct Air Force Scouts for a special program were launched by the NASA/DOD Scout organization. Six Scout vehicles were funded on MIPR 62-6 and one on MIPR 63-32. Table CVI summarizes all of the DOD funding to the Scout Project Office.

TABLE LXXX - SCOUT NASA PRODUCTION EXPENDITURES

PHASES II AND III	FY 1965 & Prior	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	FY 1972	FY 1973	TOTAL
Vehicles (01-01)	$10,009,754.90	$ 138,107.51	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$10,147,862.41
Motors (01-02) (Total)	3,917,471.61	19,783.00	0	0	0	0	0	0	0	3,937,254.61
First Stage	2,277,523.71	0								
Second Stage	476,710.07	0								
Third Stage	453,318.74	0								
Fourth Stage	709,919.09	19,783.00								
Spares (01-03)	704,601.04	23,098.00	0	0	0	0	0	0	0	727,699.04
Mission Mods (01-04)	225,716.39	0	0	0	0	0	0	0	0	225,716.39
*Supporting Activities (02)	3,132,798.88	-6,653.00	0	0	0	0	0	0	0	3,126,145.88
Product Improvement (03)	457,323.00	0	0	0	0	0	0	0	0	457,323.00
Direct OSS	98,700.00	0	0	0	0	0	0	0	0	98,700.00
PHASE IV										
Vehicles (01-01)	0	1,812,695.99	23,819.96	482,525.30	12,696.06	213,305.25	961.00	0	69,144.75	2,615,148.31
Motors (01-02) (Total)	0	1,964,678.81	674,314.31	64,709.45	0	3,709.00	0	0	0	2,707,411.57
First Stage		499,279.51	154,842.00	14,357.20	0	0	0	0	0	
Second Stage		103,810.00	546,932.00	720.95						
Third Stage		487,267.82	-29,383.00	42,896.20	0	3,709.00	0	0	0	
Fourth Stage		874,321.48	1,923.31	6,735.10	0	0	0	0	0	
Spares (01-03)	0	266,507.77	111,527.00	56,667.92	0	0	0	0	231.00	434,933.69
Mission Mods (01-04)	0	114,600.62	1,080.00	2.75	35,840.00	155,447.25	0	0	384.00	307,354.62
*Supporting Activities (02)	0	1,599,476.55	555,556.59	756,555.05	4,992.80	18,352.62	69,533.00	0	12,500.00	3,016,966.61
Product Improvement (03)	0	31,295.05	117.82	113,587.13	246,529.35	0	3,254.00	0	0	394,783.35
Direct OSS	0	100,000.00	0	0	0	0	0	0	0	100,000.00
PHASE V										
Vehicles (01-01)	0	881,235.31	1,552,718.27	493,986.51	1,307,737.91	2,842,145.22	159,069.65	0	0	7,236,892.87
Motors (01-02) (Total)	0	705,131.50	2,123,868.93	83,851.00	76,717.10	738,880.87	56,136.65	0	0	3,784,586.05
First Stage		9,782.00	726,920.00	6,387.83	5,321.94	644,124.21	28,368.64			
Second Stage		97,740.00	706,107.25	19,007.07	36,104.00	16,267.39	4,783.00			
Third Stage		334,530.50	535,356.00	7,724.29	5,881.30	7,290.65	9,003.14			
Fourth Stage		263,079.00	155,485.68	50,731.81	29,409.86	71,198.62	13,981.87			
Spares (01-03)	0	0	9,530.00	75,897.00	448,172.25	169.05	4,416.00	0	0	538,184.30
Mission Mods (01-04)	0	47,989.00	159,000.00	73,851.32	83,502.65	153,628.00	152,900.92	59,328.75	0	730,200.64
*Supporting Activities (02)	0	-15,209.11	732.00	1,283,169.51	1,150,893.16	4,690,496.20	4,751,009.76	142,302.31	118.35	12,003,512.18
Product Improvement (03)	0	0	0	0	0	0	0	0	0	0
Direct OSS	0	0	0	74,000.00	109,000.00	665,000.00	659,000.00	0	0	1,507,000.00
TOTAL NASA SCOUT PRODUCTION THROUGH PHASE V	$18,546,365.82	$7,682,737.00	$5,212,264.88	$3,558,802.94	$3,476,081.28	$9,481,133.46	$5,856,280.98	$201,631.06	$82,378.10	$54,097,675.52

---

*Includes DCASO.

TABLE LXXXI - FY 1962 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASES II AND III SUBTOTAL			$5,293,650.73
PHASE V			
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-E	Systems Engineering	$ 9,843.00
		PRODUCTION SUPPORT SUBTOTAL	$ 9,843.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 9,843.00
		PHASE V SUBTOTAL	$ 9,843.00
		FY 1962 TOTAL	$6,582,984.92

TABLE LXXXII - FY 1963 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASES II AND III SUBTOTAL			$1,224,744.26
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
20.200.193	NAS1-2650-3(cl)	Guidance Sys. Filter Mod.	$ 20,221.00
20.200.004	NAS1-2650	13 Scout Vehicles	6,005,000.00
		VEHICLES SUBTOTAL	$6,025,221.00
MOTORS (01-02)			
Third Stage			
20.200.249	NAS1-3493	X-259 Q.C. Test	$ 28,400.00
20.200.506	NAS1-3493	X-259A3 Motors	144.89
		MOTORS SUBTOTAL	$ 28,544.89

TABLE LXXXII Concluded - FY 1963 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
SPARES (01-03)			
60.400.028	NAS1-3420-14(c27)	Spares and Logistics	$ 130.48
20.200.148	NAS1-3420	Spares	70,038.19
		SPARES SUBTOTAL	$ 70,168.67
		HARDWARE SUBTOTAL	$6,123,934.56
		PHASE IV SUBTOTAL	$6,123,934.56
PHASE V			
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-E	Systems Engineering	$ 88,804.00
		PRODUCTION SUPPORT SUBTOTAL	$ 88,804.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 88,804.00
		PHASE V SUBTOTAL	$ 88,804.00
		FY 1963 TOTAL	$8,054,000.00

TABLE LXXXIII - FY 1964 NASA PRODUCTION EXPENDITURES

PHASES II AND III SUBTOTAL			$7,063,016.64
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
20.200.483	NAS1-2650-3	Painting	$ 1,089.00
20.200.398	NAS1-2650	Colvin Pressure Transducer	40,000.00
60.400.199	NAS1-4664	Sustaining Engineering	121,963.50
		VEHICLES SUBTOTAL	$ 163,052.50

TABLE LXXXIII Concluded - FY 1964 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE Continued			
MOTORS (01-02)			
Third Stage			
20.200.451	L-3920-12	X-259 Overrun	$ 22,156.00
20.200.506	NAS1-3493	X-259A3 Motors	585,479.61
20.200.249	NAS1-3493	X-259 Q.C. Test	1,500.00
Fourth Stage			
20.200.237	NAS1-3698	X-258 Motors	31,458.00
20.200.242	NAS1-3698	X-258B2 Motors for Q.C.	21,000.00
20.200.243	NAS1-3698	X-258 Spare Components	8,400.00
60.400.328	NAS1-3698-8	X-258 Rocket Motors	5,000.00
		MOTORS SUBTOTAL	$ 674,993.61
SPARES (01-03)			
20.200.420	NAS1-3420-3(c6)	Spares	$ 25,000.00
60.400.027	NAS1-3420-8(c18)	2 Radar Beacons	11,706.00
60.400.028	NAS1-3420-14(c27)	Spares and Logistics	61.68
		SPARES SUBTOTAL	$ 36,767.68
		HARDWARE SUBTOTAL	$ 874,813.79
-02 SUPPORTING ACTIVITIES			
DCASO			
45.110.018	NAS1-2650	DOD Plant Services	$ 266.50
		DCASO SUBTOTAL	$ 266.50
		SUPPORTING ACTIVITIES SUBTOTAL	$ 266.50
		PHASE IV SUBTOTAL	$ 875,080.29
PHASE V			
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-E	Systems Engineering	$ 39,755.00
		PRODUCTION SUPPORT SUBTOTAL	$ 39,755.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 39,755.00
		PHASE V SUBTOTAL	$ 39,755.00
		FY 1964 TOTAL	$8,100,000.00

TABLE LXXXIV - FY 1965 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASES II AND III SUBTOTAL			$1,645,597.75
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.142	NAS1-2650-6	Jet Vane Shafts and Fin Tips	$ 1,090.00
60.400.021	NAS1-2650-10(12)	Motor Valves	10,757.00
60.400.070	NAS1-2650-10(c12)	Motor Valves	6,582.00
60.400.069	NAS1-3589-4	Recertification	146,922.00
60.400.186	NAS1-3589-9	Vehicle Recertification Requirement	30,000.00
60.400.196	NAS1-3589-9	S^3T Checkout, S-138	23,378.00
60.400.234	NAS1-3589-9	Recertification	275,148.00
20.200.619	NAS1-3589-11(c11)	Veh. Vib. Mod. Kits, S-138, S-139	27,668.00
60.400.210	NAS1-3589-16(c37)	Fab. H.S. A-26 for SOLRAD	1,817.00
60.400.342	NAS1-3589-18(c46)	2 Transducers	2,000.00
60.400.273	NAS1-3899-26	Heat Shield Eject. Test, A-26	9,150.00
60.400.335	NAS1-4325-4(c4)	Tests of Guid. Sys. Capability, S^3T	5,000.00
60.400.340	NAS1-4325-4(c4)	Tests of Guid. Sys. Capability, S^3T	3,000.00
60.400.506	NAS1-4664-25	Final Contract Price Adjustment	5,168.00
60.400.668	NAS1-6020-2-J	Application Cork, S-156 - S-162	198.00
60.400.511	NAS1-6048	Repl. 4th-stg. Crad. Assy. & Mod. Kits	3,032.65
		VEHICLES SUBTOTAL	$ 550,910.65
MOTORS (01-02)			
First Stage			
60.400.181	NAS1-3833-3	Change in Algol Shipping Proced.	$ 7,500.00
60.400.466	NAS1-3833-3	Algol IIB Ign. Locking Device	5,384.00
60.400.471	NAS1-3833-3	Shipment Algol IIB-37	680.00
60.400.278	NAS1-3833-3(c4)	Algol IIB Qual. Program	1,173.00
60.400.109	NAS1-3833-3(c7)	Algol IIB Ign. Locking Device	2,500.00
60.400.417	NAS1-3833-3(c8)	Special Shipment, Algol IIB-37	300.00
20.200.520	NAS1-3833	24 Algol IIB Motors	1,547,276.00
60.400.176	NAS1-4785	10 Algol Handling Dollies	35,630.00
Second Stage			
60.400.121	NAS1-5034	Castor II Motors	760,000.00
60.400.325	NAS1-5034	15 Castor Motors	40,000.00
Third Stage			
20.200.506	NAS1-3493	X-259A3 Motors	35,901.88
60.400.141	NAS1-4321-1	X-259 Nozzle Checkout	2,000.00

TABLE LXXXIV Continued - FY 1965 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
MOTORS (01-02) Continued			
Fourth Stage			
60.400.060	NAS1-3698-2	X-258 Tooling	$ 60,300.00
60.400.174	NAS1-3698-2	Incr. Q.C. Source Insp., X-258	11,765.00
20.200.646	NAS1-3698-3	2 X-258E Motors	64,028.00
60.400.182	NAS1-3698-6(c9)	Add of Swatches on X-258 Motors	6,500.00
60.400.207	NAS1-3698-7(c12)	X-258 EP-87 Swatches	500.00
60.400.328	NAS1-3698-8	X-258 Rocket Motor Overrun	367,176.99
60.400.392	NAS1-3698-9	X-258 Initiator Check	800.00
60.400.429	NAS1-3698-9	Locking Collar Tooling, X-258	4,574.00
60.400.297	NAS1-3698-9(c19)	X-Ray X-258 Inhibitor Tubes	-3,538.00
60.400.301	NAS1-3698-9(c20)	Mod. X-258 RH-86 for Delta	-355.00
60.400.345	NAS1-3698-9(c23)	Nozzle Change, X-258 RH-85	-1,481.00
60.400.235	NAS1-3698-10(c21)	Salvage of Unreinforced X-258 Igns.	3,858.00
60.400.289	NAS1-3698-10(c21)	Hardware for X-258 Igniters	-3.00
60.400.322	NAS1-3698-10(c21)	X-258 Igniters	27,036.00
		MOTORS SUBTOTAL	$2,979,505.87
SPARES (01-03)			
60.400.036	NAS1-3420-7	Spares and Logistics	$ 137,432.00
60.400.027	NAS1-3420-8(c18)	Radar Beacons, 2	2,211.00
60.400.028	NAS1-3420-8(c21)	Spares and Logistics	76.00
60.400.028	NAS1-3420-8(c23)	Spares and Logistics	3,933.00
60.400.227	NAS1-3420-9	Spares and Logistics	74,885.00
60.400.028	NAS1-3420-10	Spares and Logistics	30,288.00
60.400.028	NAS1-3420-10(c1)	Spares and Logistics	36,016.00
60.400.028	NAS1-3420-10(c22)	Spares and Logistics	128.00
60.400.028	NAS1-3420-10(c24)	Spares and Logistics	176.00
60.400.251	NAS1-3420-11	Spares	13,800.00
60.400.028	NAS1-3420-12	Spares and Logistics	-3,025.00
60.400.028	NAS1-3420-12(c25)	Spares and Logistics	5,796.00
60.400.028	NAS1-3420-14(c27)	Spares and Logistics	5,104.51
60.400.251	NAS1-3420-15	Spares	-2,933.00
60.400.260	NAS1-3420-16(c26)	Trans. E Section T/M Spares	12,500.00
60.400.227	NAS1-3420-17	Underrun	-18,000.00
		SPARES SUBTOTAL	$ 298,387.51

TABLE LXXXIV Continued - FY 1965 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
MISSION MODS (01-04)			
60.400.214	NAS1-3899-24	E-Section Adapter & Sep. Sys.	$ 17,216.00
		MISSION MODS SUBTOTAL	$ 17,216.00
SHIPPING			
MOTORS			
Fourth Stage	NAS1-3698	Hercules Shipping	$ 2,575.91
		SHIPPING SUBTOTAL	$ 2,575.91
		HARDWARE SUBTOTAL	$3,848,595.94
-02 SUPPORTING ACTIVITIES			
DCASO			
45.110.018	NAS1-2650	DOD Plant Services	$ 255.95
		DCASO SUBTOTAL	$ 255.95
FIELD SERVICES (02-01)			
WALLOPS STATION			
ADB100	L-15974	Stock Issues	$ 729.84
		WALLOPS STATION SUBTOTAL	$ 729.84
		SUPPORTING ACTIVITIES SUBTOTAL	$ 985.79
		PHASE IV SUBTOTAL	$3,849,581.73

TABLE LXXXIV Concluded - FY 1965 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.621	NAS1-5610-2	Scout Vehicles	$ 188,306.52
		VEHICLES SUBTOTAL	$ 188,306.52
		HARDWARE SUBTOTAL	$ 188,306.52
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-E	Systems Engineering	$ 2,314.00
		PRODUCTION SUPPORT SUBTOTAL	$ 2,314.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 2,314.00
		PHASE V SUBTOTAL	$ 190,620.52
		FY 1965 TOTAL	$5,688,300.00

TABLE LXXXV - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASES II AND III SUBTOTAL			$ 174,335.51
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
50.050.085	L-61746	Blast Shield Hardware	$ 10,000.00
50.050.085	L-61746-4	Blast Shield Hardware	-2,488.17
50.050.133	L-61746-7	Blast Shield Drill Jig	471.31
53.110.364	L-70739	Blast Shield Tooling Plate	1,248.98
01.030.018	L-71202-20	Install Silicone on Blast Shield	175.00
01.030.024	L-71203-58	RTV-60 and RTV-11 Silicone Rubber	500.00
01.030.026	L-71204-2	Applic. ATV 60811 to Blast Shield	250.00
01.030.027	L-71205-19	Aircraft Fabricators	250.00

TABLE LXXXV Continued - FY 1966 NASA PRODUCTION EXPENDITURES

PHASE IV Continued

-01 HARDWARE Continued

VEHICLES (01-01) Continued

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
01.030.021	L-71227-12	RPD-150 Strips	$ 383.07
01.030.034	L-80283-23	Coat Blast Shield	250.00
01.030.034	L-81957-22	Apply RTV to Blast Shield	250.00
60.400.585	NAS1-1295-41	Overrun	22,597.00
20.200.004	NAS1-2650	Scout Vehicles	143,409.05
60.400.437	NAS1-3589-19	Support Recert. Program	132,369.00
60.400.514	NAS1-3589-20(c47)	Torque Tube, A-14	7,871.00
60.400.427	NAS1-3589-20(c48)	Rechecking B Section, S-138R	18,000.00
60.400.458	NAS1-3589-20(c50)	Mods. Spin Bear., S-138R, 139, 150	1,000.00
60.400.360	NAS1-3899-39	Config. Heat Shield A-28/FR-1	13,300.00
60.400.396	NAS1-3899-39	A-28 Heat Shield	5,700.00
60.400.335	NAS1-4325-4(c4)	Guid. System Checkout Cap., S^3T	649.00
60.400.440	NAS1-4664-1	Fin Tip Mods.	3,000.00
60.400.453	NAS1-4664-1	Fin Tip Mods.	1,384.00
60.400.419	NAS1-4664-1(c1)	Safe Arm Bags	2,220.00
60.400.199	NAS1-4664-5-70	Support Services for Phase IV	536,183.10
60.400.447	NAS1-4664-7	Spin Bearing, S-143C D-Section	497.00
60.400.457	NAS1-4664-7	Mod. Kits	3,114.00
60.400.458	NAS1-4664-7(c2)	Mods. Spin Bear., S-138R, S-139,S-150	4,000.00
60.400.479	NAS1-4664-7(c2)	Spin Bearing Mods.	11,808.00
60.400.506	NAS1-4664-8	Serv. and Mat., Add. Vehicles	751,953.13
60.400.451	NAS1-4664-9-Ca4	Battery Cells	1,700.00
60.400.469	NAS1-4664-10	Stat. Bal. Upper D Sect.,S-140, S-151	2,899.00
60.400.550	NAS1-4664-10(c3)	3 Calibration Units	10,528.00
60.400.451	NAS1-4664-14-Ca6	Spin Motors	75,205.00
60.400.451	NAS1-4664-14-Ca13	Circle Seal Valves	930.00
60.400.568	NAS1-4664-15	New GSE at Dallas	39,045.00
60.400.457	NAS1-4664-18	Mod. Kits	-2,203.00
60.400.506	NAS1-4664-18	Serv. and Mat., Add. Vehicles	-7,887.00
60.400.568	NAS1-4664-18	New GSE at Dallas	-12,977.00
60.400.651	NAS1-4664-18(c6)-J	Applic. Cork to Base A Fins	6,697.00
60.400.199	NAS1-4664-25	Final Contract Price Adjustment	19,209.25
60.400.506	NAS1-4664-25	Final Contract Price Adjustment	2,935.75
60.400.796	NAS1-6020-18(c6)-J	Mods. to Base A., S-160, S-162	395.00
60.400.511	NAS1-6048	Repl. 4th Stg. Cradle Assy.& Mod.Kits	5,874.52
		VEHICLES SUBTOTAL	$1,812,695.99

TABLE LXXXV Continued - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
MOTORS (01-02)			
First Stage			
60.400.388	NAS1-3833-2	Algol IIB Jet Vane Firing	$ 10,814.00
20.200.520	NAS1-3833	Algol IIB Motors	343,983.00
60.400.534	NAS1-4664-10	Press. Check Caps., 1st and 2nd Stages	5,966.00
60.400.473	NAS1-4794-2	Shipment Algol IIB-40	1,000.00
60.400.474	NAS1-4794-2	Shipment Algol IIB-38	1,000.00
60.400.430	NAS1-4794-4	Storage and Shipment Algol Motors	1,548.11
60.400.541	NAS1-4794-4	Storage and Handling Algol IIB Motors	3,368.00
60.400.600	NAS1-4794-8	Radiographic Inspect. Algol IIB-42	2,650.00
60.400.443	NAS1-5610	Algol Rocket Motor	127,100.00
Second Stage			
60.400.491	NAS1-4793-4	Lifting Bands, Castor IIA	760.00
60.400.537	NAS1-4793-6	Castor II Dummy Motor	2,900.00
60.400.591	NAS1-4793-6	Dummy Castor Assembly	1,600.00
60.400.439	NAS1-5034-2(c2)	Castor II Nozzle Investigation	2,914.00
60.400.532	NAS1-5883	9 Castor Motors (LTV)	95,636.00
Third Stage			
20.200.518	NAS1-3493-2	X-259 Tooling	50,000.00
60.400.323	NAS1-3493-2	X-259 Tooling	14,657.00
60.400.490	NAS1-3493-3(c3)	X-259 Production Delay	2,343.00
60.400.517	NAS1-3493-3(c3)	X-259 Program Extension	957.00
20.200.253	NAS1-3493	X-259A3 Spare Components	3,891.00
20.200.506	NAS1-3493	X-259A3 Motors	17,097.32
60.400.350	NAS1-4795-2	X-259 Supporting Engineering	25,000.00
60.400.349	NAS1-4795-3	Conf. X-259A2 Rocket Motor	6,000.00
60.400.519	NAS1-4795-3-1(c1)	Inspect. X-259 Rocket Motor	3,000.00
60.400.579	NAS1-4795-3-1(c1)	Mod. X-259 Rocket Motors	984.00
60.400.590	NAS1-4795-5	X-258, X-259 Doc. Review	30,000.00
60.400.589	NAS1-4795-5-2	X-258, X-259 Doc. Review	2,400.00
60.400.611	NAS1-4795-5-2	X-258, X-259 Doc. Review	1,326.00
60.400.532	NAS1-5883	8 X-259A3 Motors (LTV)	263,929.50
60.400.532	NAS1-5883	2 X-259 Igniters (LTV)	6,420.00
60.400.532	NAS1-5883	2 X-259 Chambers (LTV)	33,672.00
60.400.597	NAS1-6444	X-259 Assembly Tooling	22,999.00

TABLE LXXXV Continued - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
MOTORS (01-02) Continued			
Fourth Stage			
60.400.392	NAS1-3698-9	X-258 Initiator Check	$ 821.00
60.400.436	NAS1-3698-9	X-258 Locking Collar	1,915.00
60.400.139	NAS1-3698-10	X-258 RH-100 Postfiring	767.00
60.400.431	NAS1-3698-10(c27)	X-258 Mods. for AFOUI	-3,706.00
20.200.555	NAS1-3698-11(c29)	X-258 Rocket Motors	-278.00
60.400.513	NAS1-3698-11(c31)	X-258 RH-110 Flightworthiness Tests	2,990.00
60.400.521	NAS1-3698(c2)	Install. Temp. Recorders, X-258 Shipping Containers	1,400.00
60.400.532	NAS1-5883	4 FW-4S Motors (LTV)	226,979.00
60.400.532	NAS1-5883	10 FW-4S Initiators (LTV)	3,900.00
60.400.532	NAS1-5883	2 FW-4S Igniters (LTV)	1,168.00
60.400.532	NAS1-5883	1 FW-4S Nozzle Assembly (LTV)	3,374.00
60.400.543	NAS1-5883	3 X-258 Motors (LTV)	353,790.00
60.400.595	NAS1-5883	5 FW-4S Motors (LTV)	230,811.00
60.400.700	NAS1-5883-6(c9)	FW-4S Motors Nozzles	39,464.00
		MOTORS SUBTOTAL	$1,949,309.93
SPARES (01-03)			
60.400.653	L-84997	Spares	$ 269.77
60.400.251	NAS1-3420-14	Spares	6,615.00
60.400.251	NAS1-3420-16(c30)	Spares	14,256.00
60.400.451	NAS1-4664-9	Replacement of Spares	-77.00
60.400.451	NAS1-4664-9-Ca1-1	Replacement of Spares	479.00
60.400.451	NAS1-4664-9-Ca2-1	Replacement of Spares	5,191.00
60.400.451	NAS1-4664-9-Ca5	Replacement of Spares	1,600.00
60.400.451	NAS1-4664-9-Ca7	Replacement of Spares	700.00
60.400.451	NAS1-4664-14-Ca3	Replacement of Spares	9,420.00
60.400.451	NAS1-4664-14-Ca6	Replacement of Spares	10,410.00
60.400.451	NAS1-4664-14-Ca9	Replacement of Spares	3,200.00
60.400.451	NAS1-4664-14-Ca10	Replacement of Spares	7,175.00
60.400.451	NAS1-4664-14-Ca11	Replacement of Spares	298.00
60.400.451	NAS1-4664-14-Ca13	Replacement of Spares	545.00
60.400.451	NAS1-4664-17-Ca8	Replacement of Spares	5,200.00
60.400.451	NAS1-4664-17-Ca12	Replacement of Spares	61,849.00

TABLE LXXXV Continued - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
SPARES (01-03) Continued			
60.400.451	NAS1-4664-17-Ca14	Replacement of Spares	$ 14,000.00
60.400.451	NAS1-4664-17-Ca15	Replacement of Spares	640.00
60.400.451	NAS1-4664-17-Ca16	Replacement of Spares	63,495.00
60.400.451	NAS1-4664-17-Ca17	Replacement of Spares	68,379.00
60.400.451	NAS1-4664-17-Ca18	Replacement of Spares	4,221.00
60.400.451	NAS1-4664-17-Ca19	Replacement of Spares	150.00
60.400.451	NAS1-4664-19(c20)	Replacement of Spares	-115.00
60.400.602	NAS1-4664-19(c21)	Replacement of Spares	-470.00
60.400.602	NAS1-4664-19(c22)	Replacement of Spares	-15,000.00
60.400.575	NAS1-4793-7	Spares, Castor IIA	800.00
60.400.607	NAS1-4793-7	Spares, Castor II	1,699.00
60.400.576	NAS1-4794-7	Spares, Algol IIB	50.00
60.400.577	NAS1-4795-7	Spares, X-258 and X-259	240.00
60.400.610	NAS1-4795-7	Spares, X-258 and X-259	1,288.00
		SPARES SUBTOTAL	$ 266,507.77
MISSION MODS (01-04)			
01.030.046	L-88027-6	Payload Separation	$ 273.62
60.400.446	NAS1-3589-20(c49)	Rework and Retest E-Sect., S-138R	6,000.00
60.400.367	NAS1-3899-36	Brackets, E-Section	9,022.00
60.400.545	NAS1-3899-36-1	Marman Clamp Completion	3,635.00
60.400.334	NAS1-3899-40	5 E-Sect. Adapters, 17, 18, and 22	54,692.00
60.400.584	NAS1-4664-10	Checkout, E-Section	1,985.00
60.400.569	NAS1-4664-15(c4)	Sandia/Whittaker Gyro Package, S.M.(S153)	26,317.00
60.400.485	NAS1-5592-1	2 Timers for E-Section Completed	2,285.00
60.400.544	NAS1-5592-1	2 Timers for E-Section	11,090.00
		MISSION MODS SUBTOTAL	$ 114,600.62
SHIPPING			
MOTORS			
First Stage	NAS1-4794	Aerojet Shipping	$ 1,850.40
Third Stage	NAS1-4795-3	Hercules Shipping	2,592.00

TABLE LXXXV Continued - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
SHIPPING Continued			
MOTORS Continued			
Fourth Stage			
	NAS1-3493,-3698	Hercules Shipping	$ 62.00
	NAS1-3698	Hercules Shipping	10,496.48
	NAS1-5883	LTV Shipping	368.00
		SHIPPING SUBTOTAL	$ 15,368.88
		HARDWARE SUBTOTAL	$4,158,583.19
-02 SUPPORTING ACTIVITIES			
DCASO			
01.030.020	NAS1-900(275)	DOD Plant Services	$ 979.60
01.030.020	NAS1-1295(271)	DOD Plant Services	975.50
45.110.020	NAS1-1295	DOD Plant Services	7,259.26
45.110.020	NAS1-1330	DOD Plant Services	216.00
01.030.020	NAS1-1970(276)	DOD Plant Services	240.00
01.030.020	NAS1-2165(273,403)	DOD Plant Services	189.25
45.110.020	NAS1-2165	DOD Plant Services	489.60
01.030.020	NAS1-2189(277)	DOD Plant Services	320.00
01.030.020	NAS1-2650(223)	DOD Plant Services	1,165.75
45.110.020	NAS1-2650	DOD Plant Services	13,452.20
45.110.020	NAS1-3420	DOD Plant Services	6,693.84
01.030.020	NAS1-3420(41,88)	DOD Plant Services	4,671.32
01.030.020	NAS1-3493(168,191)	DOD Plant Services	11,349.28
45.110.020	NAS1-3493	DOD Plant Services	1,579.00
01.030.020	NAS1-3589(86,87)	DOD Plant Services	40.00
45.110.020	NAS1-3589	DOD Plant Services	28,047.16
01.030.020	NAS1-3615(42)	DOD Plant Services	5,421.58
45.110.020	NAS1-3657	DOD Plant Services	24,855.72
01.030.020	NAS1-3664(170)	DOD Plant Services	384.00
45.110.020	NAS1-3664(170)	DOD Plant Services	76.50
01.030.020	NAS1-3698(171,190)	DOD Plant Services	32,548.98
45.110.020	NAS1-3698	DOD Plant Services	33,032.79
01.030.020	NAS1-3833(172,328)	DOD Plant Services	9,123.65
45.110.020	NAS1-3833	DOD Plant Services	10,656.00
01.030.020	NAS1-3899(157)	DOD Plant Services	375.00
01.030.020	NAS1-4664(127)	DOD Plant Services	100,000.00
01.030.020	NAS1-5034(175)	DOD Plant Services	29,053.34
01.030.020	NAS1-5610(390,430)	DOD Plant Services	1,600.00
45.110.051	NAS1-5883(453)	DOD Plant Services	2,475.32
		DCASO SUBTOTAL	$ 327,270.64

TABLE LXXXV Continued - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER			
01.030.047	L-91040-26	Shipping Rings	$ 2,482.52
01.030.048	L-92234-9	Shipping Rings	2,100.00
01.030.048	L-92234-10	Shipping Rings	1,950.00
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 6,532.52
WALLOPS STATION			
ADB100	L-15974	Stock Issues	$ -1,636.61
20.200.579	NAS1-4664-3	Return Crew to Dallas	114,000.00
60.400.199	NAS1-4664-5	FY 1966 Launch Services	972,372.00
60.400.199	NAS1-4664-18	FY 1966 Launch Services	-23,094.00
20.200.579	NAS1-4664-20	Return Crew to Dallas	-79,086.00
20.200.579	NAS1-6020-5-M	Return Crew to Dallas	79,086.00
60.400.557	NAS1-6020-M	FY 1967 Launch Services	204,032.00
		WALLOPS STATION SUBTOTAL	$1,265,673.39
		SUPPORTING ACTIVITIES SUBTOTAL	$1,599,476.55
-03 PRODUCT IMPROVEMENT			
ALGOL NOZZLE AND FAILURE INVESTIGATION			
60.400.840	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Mods., S-160C	$ 31,295.05
		ALGOL NOZZLE SUBTOTAL	$ 31,295.05
		PRODUCT IMPROVEMENT SUBTOTAL	$ 31,295.05
		PHASE IV SUBTOTAL	$5,789,254.79

TABLE LXXXV Continued - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.832	NAS1-5610-9(c15)	Temperature Meas., S-170 and Sub.	$ 2,300.00
60.400.443	NAS1-5610	8 Scout Vehicles	837,435.31
60.400.443	NAS1-5610	Transition C Structure	18,350.00
60.400.443	NAS1-5610	Transition Lower D Structure	6,650.00
60.400.443	NAS1-5610	Heat Shield	16,500.00
		VEHICLES SUBTOTAL	$ 881,235.31
MOTORS (01-02)			
First Stage			
60.400.830	NAS1-5610-9(c4)	Algol IIB Squib Retainer Assy. Pkg'g	$ 4,600.00
60.400.443	NAS1-5610	4 Algol Igniter Assemblies	3,340.00
60.400.443	NAS1-5610	2 Algol Squib Retainers	352.00
60.400.443	NAS1-5610	2 Algol Nozzle Leak Check Toolings	1,490.00
Second Stage			
60.400.532	NAS1-5883	Castor Motor (LTV)	97,740.00
Third Stage			
60.400.829	NAS1-5610-8(c12)	Mods. X-259 Initr. & Nozz. Exit Cone	10,500.00
60.400.829	NAS1-5610-8(c13)	Mods. X-259 Initr. & Nozz. Exit Cone	1,450.00
60.400.532	NAS1-5883	4 X-259A3 Motors (LTV)	322,580.50
Fourth Stage			
60.400.443	NAS1-5610	8 FW-4S Motors	263,079.00
		MOTORS SUBTOTAL	$ 705,131.50
MISSION MODS (01-04)			
60.400.422	NAS1-3899-40	2 E-Sections, 19 and 21	$ 31,617.00
60.400.542	NAS1-3899-40-1(c1)	2 E-Section Adapters, 19 and 21	317.00
60.400.544	NAS1-5592-1	E-Section Sep. Systems, AD/IE	16,055.00
		MISSION MODS SUBTOTAL	$ 47,989.00
		HARDWARE SUBTOTAL	$1,634,355.81

TABLE LXXXV Concluded - FY 1966 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
FIELD SERVICES (02-01)			
WALLOPS STATION			
60.400.585	NAS1-1295	Adjust Escrow Return Crew to Dls.	$ -22,145.00
		WALLOPS STATION SUBTOTAL	$ -22,145.00
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-E	Systems Engineering	$ 6,935.89
		PRODUCTION SUPPORT SUBTOTAL	$ 6,935.89
		SUPPORTING ACTIVITIES SUBTOTAL	$ -15,209.11
		PHASE V SUBTOTAL	$1,619,146.70
PHASE VI			
-01 HARDWARE			
MOTORS (01-02)			
Fourth Stage			
60.400.443	NAS1-5610	FW-4S Motors	$ 1,481.00
		MOTORS SUBTOTAL	$ 1,481.00
		HARDWARE SUBTOTAL	$ 1,481.00
-03 PRODUCT IMPROVEMENT			
FIFTH STAGE			
65.510.055	NAS1-7102	BE-3-A9 Motors	$ 15,782.00
		FIFTH STAGE SUBTOTAL	$ 15,782.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ 15,782.00
		PHASE VI SUBTOTAL	$ 17,263.00
		FY 1966 TOTAL	$7,600,000.00

TABLE LXXXVI - FY 1967 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
53.340.507	L-95861	Hardware	$ 661.20
60.400.648	NAS1-4664-18(c6)-J	Applic. Cork to Base A Fins, S-150	4,000.00
60.400.668	NAS1-6020-2-J	Application Cork to S-156 - S-162	1,686.28
60.400.668	NAS1-6020-2-K	Application Cork to S-156 - S-162	2,474.72
60.400.718	NAS1-6020-10(c3)-K	Heat Shield Mods. and Fit Check	14,719.00
		VEHICLES SUBTOTAL	$ 23,541.20
MOTORS (01-02)			
First Stage			
60.400.619	NAS1-4794-9	Mods. Algol Handling Dollies	$ 3,150.00
60.400.682	NAS1-5610-4(c2)	Algol Initiators	2,114.00
60.400.443	NAS1-5610	Algol Rocket Motors	149,578.00
Second Stage			
60.400.632	NAS1-4793-8	Repair Castor II	1,052.00
60.400.639	NAS1-4793-9	Castor II S/N 2 Case	4,212.00
60.400.532	NAS1-5883	Castor Rocket Motors (LTV)	547,000.00
60.400.532	NAS1-5883-2(c1)	1 Castor Rocket Motor (LTV)	-5,981.00
60.400.532	NAS1-5883-2(c6)	1 Castor Rocket Motor (LVV)	-3,766.00
60.400.688	NAS1-5883-6(c11)	Refurb. Castor Mtr.Ship. Containers	4,415.00
Third Stage			
60.400.635	L-84995	Casting Powder, X-259 Motor	5,160.00
60.400.635	L-84995-1	X-259 Casting Powder	-50,000.00
60.400.590	NAS1-4795-5-3	X-258, X-259 Documentation Review	3,000.00
60.400.725	NAS1-4795-5-3	X-258, X-259 Documentation Review	1,883.00
60.400.623	NAS1-4795-8	Insp. & Del. X-259, HPC-151 & HPC-186	10,415.00
Fourth Stage			
01.030.067	L-353110497	FW-4S Shipping Rings	1,850.00
01.030.067	L-1553110580	FW-4S Shipping Rings	67.66
		MOTORS SUBTOTAL	$ 674,149.66

TABLE LXXXVI Continued-FY 1967 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
SPARES (01-03)			
60.400.387	L-61691	Spares Repair	$ 76,902.00
60.400.653	L-84997	Spares Repair	118.89
60.400.451	NAS1-4664-17-Ca12	Procurement of Spares	-24,425.00
60.400.602	NAS1-4664-17-Ca19	Procurement of Spares	1,300.00
60.400.451	NAS1-4664-19(c20)	Procurement of Spares	525.00
60.400.602	NAS1-4664-19(c21)	Procurement of Spares	3,600.00
60.400.602	NAS1-4664-19(c22)	Procurement of Spares	15,000.00
60.400.451	NAS1-4664-21-Ca23	Repair MIG Gyro	15,560.00
60.400.741	NAS1-6020-7-L	Spares	22,107.00
		SPARES SUBTOTAL	$ 110,687.89
MISSION MODS (01-04)			
60.400.661	L-84996	Mods., E-Sections 1 and 15	$ 1,080.00
		MISSION MODS SUBTOTAL	$ 1,080.00
SHIPPING			
VEHICLES			
	NAS1-6020	LTV Shipping	$ 278.76
MOTORS			
Third Stage			
	NAS1-4795-2	Hercules Shipping	153.60
	NAS1-5883	LTV Shipping	5.40
Fourth Stage			
	NAS1-6020	LTV Shipping	5.65
SPARES			
	NAS1-6020	LTV Shipping	839.11
		SHIPPING SUBTOTAL	$ 1,282.52
		HARDWARE SUBTOTAL	$ 810,741.27

TABLE LXXXVI Continued - FY 1967 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES			
DCASO			
45.110.051	NAS1-1330(198)	DOD Plant Services	$ 0.40
01.030.020	NAS1-2165(403)	DOD Plant Services	48.00
45.110.051	NAS1-3615(36)	DOD Plant Services	160.00
45.110.051	NAS1-4794(219)	DOD Plant Services	182.80
45.110.051	NAS1-4795(221)	DOD Plant Services	384.00
45.110.051	NAS1-5883(461)	DOD Plant Services	184.00
45.110.051	NAS1-6444(663)	DOD Plant Services	96.00
		DCASO SUBTOTAL	$ 1,055.20
FIELD SERVICES (02-01)			
WALLOPS STATION			
60.400.557	NAS1-6020-M	FY67 Launch Services	$ 554,501.39
		WALLOPS STATION SUBTOTAL	$ 554,501.39
		SUPPORTING ACTIVITIES SUBTOTAL	$ 555,556.59
-03 PRODUCT IMPROVEMENT			
ALGOL NOZZLE AND FAILURE INVESTIGATION			
60.400.840	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Mods., S-160C	$ 117.82
		ALGOL NOZZLE SUBTOTAL	$ 117.82
		PRODUCT IMPROVEMENT SUBTOTAL	$ 117.82
		PHASE IV SUBTOTAL	$1,366,415.68

TABLE LXXXVI Continued - FY 1967 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.443	NAS1-5610	Procurement of Scout Vehicles	$2,551,508.27
60.400.443	NAS1-5610-1	Procurement of Scout Vehicles	-1,000,000.00
60.400.443	NAS1-5610-4	Procurement of Scout Vehicles	-5,100.00
60.400.736	NAS1-6020-10-K	Fab.&Inst.Cork Base A Fins,S163-S174	6,310.00
		VEHICLES SUBTOTAL	$1,552,718.27
MOTORS (01-02)			
First Stage			
60.400.443	NAS1-5610	8 Algol Rocket Motors	$ 674,780.00
60.400.443	NAS1-5610	3 Algol Nozzle Assemblies	52,140.00
Second Stage			
60.400.443	NAS1-5610	7 Castor II Rocket Motors	705,492.00
Third Stage			
60.400.635	L-84995	Casting Powder, X-259 Motor	70,602.00
60.400.443	NAS1-5610	8 Antares X-259 Motors	464,754.00
Fourth Stage			
60.400.443	NAS1-5610	7 FW-4S Motors	147,319.88
60.400.751	NAS1-5610-8(c12)	25 X-259 & 25 X-258/FW-4S Initiators	7,625.00
		MOTORS SUBTOTAL	$2,122,712.88
SPARES (01-03)			
60.400.729	NAS1-6020-14-Ca19-L	Spares	$ 9,500.00
		SPARES SUBTOTAL	$ 9,500.00
MISSION MODS (01-04)			
62.400.007	NAS1-6935-4	Mods. for Reentries F and G	$ 159,000.00
		MISSION MODS SUBTOTAL	$ 159,000.00

TABLE LXXXVI Concluded - FY 1967 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
SHIPPING			
MOTORS			
Second Stage	NAS1-6020	LTV Shipping	$ 615.25
Fourth Stage	NAS1-5610	LTV Shipping	540.80
SPARES	NAS1-5610	LTV Shipping	30.00
		SHIPPING SUBTOTAL	$ 1,186.05
		HARDWARE SUBTOTAL	$3,845,117.20
-02 SUPPORTING ACTIVITIES			
DCASO			
45.110.051	NAS1-5610(563)	DOD Plant Services	$ 532.00
		DCASO SUBTOTAL	$ 532.00
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-E	Systems Engineering	$ 200.00
		PRODUCTION SUPPORT SUBTOTAL	$ 200.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 732.00
		PHASE V SUBTOTAL	$3,845,849.20
PHASE VI PLANNED			$ 187,337.12
		FY 1967 TOTAL	$5,399,602.00
		01 TOTAL	$4,706,643.59
		02 TOTAL	$ 556,288.59
		03 TOTAL	$ 136,669.82

TABLE LXXXVII - FY 1968 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.803	L-1360400803	Tools	$ 173.26
60.400.797	NAS1-4664-22-A	Incentive Fee	153,144.32
60.400.557	NAS1-6020-3-J	Vehicle Mod. Checkout	82,642.61
60.400.557	NAS1-6020-9-H	Support to Vehicle Checkout	141,772.74
60.400.557	NAS1-6020-9-K	Vehicle Checkout	82,253.74
60.400.788	NAS1-6020-15-J	Vehicle Mod. Checkout	13,001.00
60.400.804	NAS1-6020-15-K	Vehicle Checkout	5,380.00
60.400.796	NAS1-6020-18(c6)-K	Base A Mods, S-160, S-161, S-162	1,000.00
		VEHICLES SUBTOTAL	$ 479,367.67
MOTORS (01-02)			
First Stage			
60.400.783	NAS1-4794-9-2(c2)	Mods. Algol Handling Dollies	$ 2,800.00
Third Stage			
60.400.725	NAS1-4795-5-3	X-258, X-259 Doc. Review	18,602.00
60.400.732	NAS1-4795-8-1	Mods. X-259 HPC-186	3,398.00
60.400.621	NAS1-5610-2	Antares X-259 Motors	636.00
60.400.729	NAS1-6020-16-Ca18-S	Reinspect. 4 X-259 Motors	18,000.00
		MOTORS SUBTOTAL	$ 43,436.00
SPARES (01-03)			
60.400.653	L-84997	Spares Repair	$ 34,242.34
60.400.816	L-84997	Spares	17,101.00
60.400.451	NAS1-4664-21-17	Spares	-825.00
60.400.451	NAS1-4664-21-Ca23	Repair MIG Gyro	-192.00
60.400.451	NAS1-4664-21-Ca24	Spares	4,057.00
		SPARES SUBTOTAL	$ 54,383.34
MISSION MODS (01-04)			
60.900.003	NAS1-6935-33	Refurbishment of S-144CR	$ 2.75
		MISSION MODS SUBTOTAL	$ 2.75

TABLE LXXXVII Continued - FY 1968 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-01 HARDWARE Continued			
SHIPPING			
VEHICLES			
	NAS1-6020	LTV Shipping	$ 3,157.63
MOTORS			
First Stage			
	NAS1-4794-5	Aerojet Shipping	144.00
	NAS1-4794-9	Aerojet Shipping	1,820.00
	NAS1-4794	Aerojet Shipping	5,536.80
	NAS1-6020	LTV Shipping	4,056.40
Second Stage			
	NAS1-5883	LTV Shipping	104.37
	NAS1-6020	LTV Shipping	616.58
Third Stage			
	L-84994	USNAD Shipping	540.80
	NAS1-5883	LTV Shipping	305.75
	NAS1-6020	LTV Shipping	1,413.65
Fourth Stage			
	NAS1-3698	Hercules Shipping	20.30
	NAS1-5883	LTV Shipping	6,655.00
	NAS1-6020	LTV Shipping	59.80
SPARES			
	NAS1-6020	LTV Shipping	2,284.58
		SHIPPING SUBTOTAL	$ 26,715.66
		HARDWARE SUBTOTAL	$ 603,905.42
-02 SUPPORTING ACTIVITIES			
DCASO			
01.030.020	NAS1-585(479)	DOD Plant Services	$ 911.20
45.110.051	NAS1-4664(84)	DOD Plant Services	1,328.00
45.110.051	NAS1-5883(461)	DOD Plant Services	396.00
		DCASO SUBTOTAL	$ 2,635.20

TABLE LXXXVII Continued - FY 1968 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01)			
WALLOPS STATION			
20.200.579	NAS1-4664-23	Unused Return Crew Funds	$ -10,998.00
60.400.557	NAS1-6020-9-M	FY67 Launch Services	328,627.00
		WALLOPS STATION SUBTOTAL	$ 317,629.00
PRODUCTION SUPPORT (02-02)			
60.400.961	NAS1-3657-8	Completion of Contract	$ 4.00
60.400.557	NAS1-6020-9-C	Preflight Planning	5,936.39
60.400.557	NAS1-6020-9-F	Reliability	260,197.20
60.400.557	NAS1-6020-9-G	Standardization	170,153.26
		PRODUCTION SUPPORT SUBTOTAL	$ 436,290.85
		SUPPORTING ACTIVITIES SUBTOTAL	$ 756,555.05
-03 PRODUCT IMPROVEMENT			
ALGOL NOZZLE AND FAILURE INVESTIGATION			
60.400.840	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Mods., S-160C	$ 13,587.13
60.400.848	NAS1-6020-30-Ca51-R	S-160 Algol Nozzle Investigation	100,000.00
		ALGOL NOZZLE SUBTOTAL	$ 113,587.13
		PRODUCT IMPROVEMENT SUBTOTAL	$ 113,587.13
		PHASE IV SUBTOTAL	$1,474,047.60
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.621	NAS1-5610-2	Scout Vehicles	$ 205,048.30
60.400.759	NAS1-5610-7	Heat Shield and D-Section Mods	38,750.00
60.400.760	NAS1-5610-7	Repl. Aluminum Tubes with S.S.	6,510.00

TABLE LXXXVII Continued - FY 1968 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
VEHICLES (01-01) Continued			
60.400.557	NAS1-6020-9-H	Support to Vehicle Checkout	$ 50,278.71
60.400.557	NAS1-6020-9-J	Vehicle Mod. Checkout	16,941.50
60.400.557	NAS1-6020-9-K	Vehicle Checkout	168,217.07
60.400.738	NAS1-6020-13-K	Mods. Body Bending Filters, S-160-162	2,224.93
		VEHICLES SUBTOTAL	$ 487,970.51
MOTORS (01-02)			
First Stage			
60.400.914	NAS1-5610-16	Algol Motor	$ 32.03
Third Stage			
60.400.766	NAS1-5610-8(c13)	Mods. X-259 Nozzle Exit Cones	2,400.00
Fourth Stage			
60.400.813	NAS1-5610-10(c16)	Reconfig.& Instal. 16 FW-4S Mtr.Insrt.	46,413.00
60.400.875	NAS1-5610-15(M11)	Leak Test, FW-4S Motor	1,186.00
60.400.779	NAS1-5883-7(c17)	Nozzle Inserts, FW-4S Motors	2,400.00
		MOTORS SUBTOTAL	$ 52,431.03
SPARES (01-03)			
60.400.729	NAS1-6020-8-Ca1-L	Spares	$ 13.00
60.400.729	NAS1-6020-8-Ca2-L	Spares	430.00
60.400.729	NAS1-6020-8-Ca3-L	Spares	86.00
60.400.729	NAS1-6020-8-Ca4-L	Spares	2,768.00
60.400.729	NAS1-6020-8-Ca6-L	Spares	-743.00
60.400.729	NAS1-6020-8-Ca7-L	Spares	5,970.00
60.400.729	NAS1-6020-8-Ca8-L	Spares	374.00
60.400.729	NAS1-6020-8-Ca10-L	Spares	78.00
60.400.729	NAS1-6020-11-Ca13-1-L	Spares	45,000.00
60.400.729	NAS1-6020-14-Ca17-L	Spares	95.00
60.400.729	NAS1-6020-14-Ca19-L	Spares	217.00
60.400.729	NAS1-6020-14-Ca24-L	Spares	11,918.00
60.400.729	NAS1-6020-14-Ca25-L	Spares	1,450.00
60.400.729	NAS1-6020-14-Ca26-L	Spares	165.00
60.400.729	NAS1-6020-14-Ca27-L	Spares	1,287.00
60.400.729	NAS1-6020-14-Ca29-L	Spares	3,505.00
60.400.729	NAS1-6020-14-Ca33-L	Spares	734.00
60.400.729	NAS1-6020-20-Ca40-L	Spares	2,550.00
		SPARES SUBTOTAL	$ 75,897.00

TABLE LXXXVII Continued - FY 1968 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
MISSION MODS (01-04)			
60.400.847	NAS1-5592-15(c5)	E-Sect. Mods., Push-off Ring	$ 360.00
60.400.857	NAS1-6020-37(M22)-K	Dyn. Bal. Upper D Section	1,370.62
60.400.774	NAS1-6935-6	Mods. to 5 E-Sections	2,400.00
60.400.758	NAS1-6935-7	Mods. to 4 E-Sect. Sep. Sys.	6,000.00
60.400.786	NAS1-6935-7	Mods. to 4 E-Sect. Sep. Sys.	2,013.00
60.400.798	NAS1-6935-9-1(c1)	Reentry F Payload RFI Test	750.00
60.400.752	NAS1-6935-11	6 Test and 4 Flt. E-Sect. Sep. Sys.	60,000.00
60.400.846	NAS1-6935-11-3(c1)	Modification of E-Section	950.00
		MISSION MODS SUBTOTAL	$ 73,843.62
SHIPPING			
VEHICLES			
	NAS1-5610	LTV Shipping	$ 5,999.95
	NAS1-6020	LTV Shipping	6.05
	NAS1-7256	LTV Shipping	10.00
MOTORS			
First Stage	NAS1-5610	LTV Shipping	6,263.80
	NAS1-6020	LTV Shipping	92.00
Second Stage	NAS1-5610	LTV Shipping	19,007.07
Third Stage	NAS1-5610	LTV Shipping	5,178.40
	NAS1-6020	LTV Shipping	145.89
Fourth Stage	NAS1-5610	LTV Shipping	308.29
	NAS1-5883	LTV Shipping	104.96
	NAS1-6020	LTV Shipping	39.56
	NAS1-7256	LTV Shipping	280.00
MISSION MODS	NAS1-5610	LTV Shipping (OWL)	7.70
		SHIPPING SUBTOTAL	$ 37,443.67
		HARDWARE SUBTOTAL	$ 727,585.83

TABLE LXXXVII Concluded - FY 1968 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
DCASO			
45.110.051	NAS1-5610(563)	DOD Plant Services	$ 696.00
OSS	DIRECT DCASO		37,000.00
		DCASO SUBTOTAL	$ 37,696.00
FIELD SERVICES (02-01)			
WALLOPS STATION			
ADB100	L-15974	Stock Issues	$ 7.58
60.400.557	NAS1-6020-9-M	FY67 Launch Services	777,145.61
20.200.579	NAS1-6020-15-M	Return Crew to Dallas	10,998.00
66.000.031	NAS1-10650	Reflectoscopes	2.85
		WALLOPS STATION SUBTOTAL	$ 788,154.04
WESTERN TEST RANGE			
60.400.557	NAS1-6020-9-N	AFWTR Field Team	$ 2,653.00
		WESTERN TEST RANGE SUBTOTAL	$ 2,653.00
PRODUCTION SUPPORT (RAS174) (02-02)			
60.400.557	NAS1-6020-9-D	Data Analysis	$ 163,623.26
60.400.557	NAS1-6020-9-F	Reliability	116,891.98
60.400.557	NAS1-6020-9-G	Standardization	210,431.00
60.400.790	NAS1-7256-18-F	Reliability Program	2.74
		PRODUCTION SUPPORT SUBTOTAL	$ 490,948.98
SHIPPING	NAS1-7256	LTV Shipping	$ 717.49
		SHIPPING SUBTOTAL	$ 717.49
		SUPPORTING ACTIVITIES SUBTOTAL	$1,320,169.51
		PHASE V SUBTOTAL	$2,047,755.34
PHASE VI PLANNED			$1,677,189.96
PHASE VII PLANNED			$ 1,007.10
		FY 1968 TOTAL	$5,200,000.00
		01 TOTAL	$3,008,349.73
		02 TOTAL	$2,076,799.56
		03 TOTAL	$ 114,850.71

TABLE LXXXVIII - FY 1969 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.275	NAS1-3589-23	Final Contract Price Adjustment	$ 10,560.00
60.400.557	NAS1-6020-3-J	Vehicle Modification Checkout	1,388.00
60.400.884	NAS1-6020-30-Ca51-J	Vehicle Modification Checkout	4,769.75
60.400.898	NAS1-6020-31-J	Vehicle Modification Checkout	6,537.31
60.400.557	NAS1-6020-J	Vehicle Modification Checkout	1.00
		VEHICLES SUBTOTAL	$ 23,256.06
MISSION MODS (01-04)			
60.400.888	NAS1-6935-15	Recertification of S-144CR	$ 34,640.00
60.900.003	NAS1-6935-33	Refurbishment of S-144CR	1,200.00
		MISSION MODS SUBTOTAL	$ 35,840.00
		HARDWARE SUBTOTAL	$ 59,096.06
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.961	NAS1-3657-8	Completion of Contract	$ 4,973.38
60.400.557	NAS1-6020-B	Payload	19.42
		PRODUCTION SUPPORT SUBTOTAL	$ 4,992.80
		SUPPORTING ACTIVITIES SUBTOTAL	$ 4,992.80
-03 PRODUCT IMPROVEMENT (RAS173)			
ALGOL NOZZLE AND FAILURE INVESTIGATION			
60.400.845	NAS1-6020-30-Ca51-R	Algol IIB Nozzle Insert	$ 0.10
60.400.854	NAS1-6020-30-Ca51-R	S-160C Algol Nozzle Investigation	98,114.00
60.400.863	NAS1-6020-30-Ca51-R	Dissection of Algol IIB Nozzle	8,500.00
60.400.864	NAS1-6020-30-Ca51-R	Dissection of Algol IIB Nozzle	9,500.00
60.400.866	NAS1-6020-30-Ca51-R	S-160C Algol Nozzle Investigation	88,303.00
60.400.884	NAS1-6020-30-Ca51-R	Eval. Prod. and Handling Graphite	30,342.25
60.400.773	NAS1-6020-35-Ca61-S	Radiography, Algol Nozzle	-210.00
60.400.861	NAS1-6935-25	Radiography Algol IIB Nozzle Insert	6,000.00
60.400.922	NAS1-6935-25	Radiography Algol IIB Nozzle Insert	5,950.00
		ALGOL NOZZLE SUBTOTAL	$ 246,499.35

TABLE LXXXVIII Continued - FY 1969 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-03 PRODUCT IMPROVEMENT (RAS173) Continued			
SHIPPING			
	NAS1-6020	LTV Shipping	$ 30.00
		SHIPPING SUBTOTAL	$ 30.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ 246,529.35
		PHASE IV SUBTOTAL	$ 310,618.21
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
52.220.649	L0352220649	Shipping Rings	$ 1,850.00
60.400.621	NAS1-5610-2	Procurement Scout Vehicle	24,441.10
60.400.557	NAS1-6020-5-H	Support to Vehicle Sheckout	48,495.05
60.400.892	NAS1-6935-16	Mods. to Veh.& GSE for New D-Sect.	10,837.00
60.400.790	NAS1-7256-H	Support to Vehicle Processing	202,000.00
60.400.790	NAS1-7256-J	Vehicle Processing	736,000.00
60.400.790	NAS1-7256-T	Special Invest. Mods.	166,885.12
60.400.790	NAS1-7256-T	9 3-Ft. Payload Umbilicals	8,325.00
60.400.790	NAS1-7256-T	13 Finished Heat Shields	92,800.00
60.400.790	NAS1-7256-T	12 Winterization Kits	3,058.00
60.400.790	NAS1-7256-T	56 Spin Motors Reworked	4,394.00
60.400.790	NAS1-7256-T	9 Base-A Corks S166, S170-177	8,601.00
		VEHICLES SUBTOTAL	$1,307,686.27
MOTORS (01-02)			
First Stage			
60.400.890	NAS1-5610-13	Storage 7 Algol IIB Mtrs. at Aerojet	$ 3,205.00
Second Stage			
60.400.773	NAS1-6020-35-Ca77-S	Inspection of Castor IIA Nozzle Tool	-109.00
60.400.833	NAS1-6020-35-Ca77-S	Inspection of Castor IIA Nozzle Tool	500.00
60.400.927	NAS1-9273	Castor Motors Shipping Containers	35,703.00

TABLE LXXXVIII Continued - FY 1969 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
MOTORS (01-02) Continued			
Third Stage			
60.400.773	NAS1-6020-32-S	Cancel.Prep. for Ship. X-259 Chamber	$ -657.00
Fourth Stage			
60.400.870	NAS1-5610-10(c17)	Rough Road Test FW-4S Ship. Conts.	2,269.54
60.400.914	NAS1-5610-16	Gov. Furnished FW-4S Tooling, UTC	20,154.97
60.400.773	NAS1-6020-35-Ca69-S	Prep. X-258 Mtr. for Shipment	-228.00
60.400.773	NAS1-6020-35-Ca73-S	FW-4S Nozzle 30302 Mod.	346.00
60.400.910	NAS1-6935-21	Examination of FW-4S Nozzle	3,380.00
		MOTORS SUBTOTAL	$ 64,564.51
SPARES (01-03)			
60.400.816	L-84997	Spares	$ 59,894.00
60.400.729	NAS1-6020-28-Ca60-L	Procurement of Spares	423.00
60.400.729	NAS1-6020-36(M20)-L	Spares	-630.00
60.400.729	NAS1-6020-36(M28)-L	Spares	-888.00
60.400.729	NAS1-6020-36-Ca65A-L	Miscellaneous Spares for N_2 Cart	1,333.00
60.400.729	NAS1-6020-36-Ca68-L	Procurement of Spares	-2,552.00
60.400.729	NAS1-6020-36-Ca72-L	Proc.Compnts.(VAFB) Vinson Fuel Unit	6,321.00
60.400.729	NAS1-6020-36-Ca74-L	Proc. Initiator Cartridge Assys.	21,804.00
60.400.729	NAS1-6020-36-Ca75-L	Spares	-141.00
60.400.729	NAS1-6020-36-Ca76-L	Proc. Miscellaneous Spares	4,965.00
60.400.881	NAS1-7256-M	Spares	344,998.90
		SPARES SUBTOTAL	$ 435,527.90
MISSION MODS (01-04)			
60.400.887	NAS1-5880-5	Launch Support for San Marco C	$ 9,300.00
60.400.916	NAS1-5880-5	Launch Support for San Marco C	31,399.02
60.400.557	NAS1-6020-3-C	2 X-258 Cases (for AEC)	1,000.00
60.400.871	NAS1-6020-24(c7)-K	S-161C Special Instrumentation	2,400.00
60.400.844	NAS1-6020-29(M21)-K	Redesgn. 1st & 2nd Stg.Hdcp.Press.Tub.	9,100.00
60.400.844	NAS1-6020-37(M22)-K	Redesgn. 1st & 2nd Stg.Hdcp.Press.Tub.	-30.00
60.400.857	NAS1-6020-37(M22)-K	Dynamic Bal. Upper D Section	-1,370.62
60.400.846	NAS1-6935-11-3(c1)	E-Section Mods., Push-off Rings	50.00
60.400.903	NAS1-6935-11-3(c1)	E-Section Mods., Corrct. Push-off Rings	670.00

TABLE LXXXVIII Continued - FY 1969 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
MISSION MODS (01-04) Continued			
60.400.891	NAS1-6935-11-4(M2)	Mods. to P/L Sep. Timers, E-Section	$ 33,255.00
60.400.891	NAS1-6935-11-9	Final Adjustment of Contract Costs	-15,383.00
60.400.880	NAS1-6935-15-1	Delete Elec. Harness Insp. Rqmt.	-1,582.00
60.400.929	NAS1-6935-29	Level Vib. FAT of 2 SM Sep. Sys.	9,490.00
60.400.902	NAS1-7256-4-Ca4-S	Des. & Fab. 2 SM Protective Barrs.	5,200.00
		MISSION MODS SUBTOTAL	$ 83,498.40
SHIPPING			
VEHICLES			
	NAS1-5610	LTV Shipping	$ 10.39
	NAS1-7256	LTV Shipping	41.25
MOTORS			
First Stage			
	NAS1-4794	Aerojet Shipping	-1,290.75
	NAS1-5610	LTV Shipping	3,184.00
	NAS1-6020	LTV Shipping	98.34
	NAS1-6935	LTV Shipping	125.35
Second Stage			
	NAS1-7256	LTV Shipping	10.00
Third Stage			
	L-84994	USNAD Shipping	2,526.00
	NAS1-5610	LTV Shipping	805.00
	NAS1-7256	LTV Shipping	3,207.30
Fourth Stage			
	NAS1-3493	Hercules Shipping	7.60
	NAS1-3698	Hercules Shipping	27.40
	NAS1-5610	LTV Shipping	3,086.40
	NAS1-6020	LTV Shipping	325.95
	NAS1-10000	LTV Shipping	40.00
SPARES			
	NAS1-7256	LTV Shipping	2,084.35
MISSION MODS			
	NAS1-7256	LTV Shipping	4.25
		SHIPPING SUBTOTAL	$ 14,292.83
		HARDWARE SUBTOTAL	$1,905,569.91

TABLE LXXXVIII Continued - FY 1969 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
DCASO			
OSS DIRECT			$ 109,000.00
		DCASO SUBTOTAL	$ 109,000.00
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER (RAS175)			
ADB100	L-15974	Stock Issues	$ 5.84
60.400.819	L-17522	4 Sta. Switching Sys. Location	14,260.70
60.400.869	L-28229	Calculator and Printer	6,346.71
60.400.926	L-33463	Microfilm Reader	433.35
56.330.349	NAS1-10166	Scout Offices, 1192E	18,000.00
56.330.377	NAS1-10166	Scout Offices, 1192E	450.00
56.330.422	NAS1-10695	Scout Offices, 1192E	195,400.00
56.330.471	NAS1-10695-1	Scout Offices, 1192E	7,233.24
56.330.502	NAS1-10695-2	Scout Offices, 1192E	180.49
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 242,310.33
WALLOPS STATION (RAS161, RAS171, RAS191)			
ADB100	L-15974	Stock Issues	$ 32.60
40.101.010	L-34548	Display Case	265.00
60.400.941	L-36308	Slides File	56.15
52.230.397	L2152230397	Gears	11.27
52.420.861	L2452420861	Sealant Gun	74.85
60.900.044	NAS1-6020-38-M	Retransfer of Expenses, Personnel WI	-27,037.00
60.400.790	NAS1-7256-N	Wallops Field Services	400,000.00
		WALLOPS STATION SUBTOTAL	$ 373,402.87
WESTERN TEST RANGE (RAS172, RAS192)			
ADB100	L-15974	Stock Issues	$ 785.44
52.420.541	L-25466	Aluminide Powder	225.00
01.030.095	L-25815	Actuator Bracket	86.00
42.101.002	L-27402	Catalyst	340.00
60.400.946	L-84994-2	Storage of Scout Rocket Motors-Nev.	2,000.00
40.101.015	L0152410787	Machine Fabrication, Material	1,990.00

TABLE LXXXVIII Continued - FY 1969 NASA PRODUCTION EXPENDITURES

PHASE V Continued

-02 SUPPORTING ACTIVITIES Continued

FIELD SERVICES (02-01) Continued

WESTERN TEST RANGE (RAS172, RAS192) Continued

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
01.030.095	L0352220079	Tool and Electrical Services	$ 2,100.00
01.030.097	L0352220079-1	Tool and Electrical Services	280.00
60.400.841	NAS1-8584	Rate-of-Turn Table	15,750.00
66.000.047	NAS1-10000-12(M11)-N	Transport. Launch Supt. Ops., VAFB	107.54
	Suballotment WTR		24,788.00
		WESTERN TEST RANGE SUBTOTAL	$ 48,451.98

PRODUCTION SUPPORT (RAS174)(02-02)

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
ADB100	L-15974	Stock Issues	$ 201.54
66.000.073	L-66982	Magnafax Supplies	25.39
60.400.557	NAS1-6020-9-C	Preflight Planning	2,700.00
60.400.880	NAS1-6020-37(M26)-B	GRS P/L-to-Scout-Veh. Compat.Anal.	120.00
60.400.557	NAS1-6020-E	Systems Engineering	-180.49
60.400.889	NAS1-6935-19	Hydraulic Test Equipment	6,750.00
60.400.878	NAS1-6935-22	Extend Shelf Life, FW-4S Motors	17,257.00
60.400.925	NAS1-6935-26	Castor IIA Ext. Shelf Life Study	13,100.00
60.400.930	NAS1-6935-27	Castor II Motor Aging Prog. Testing	2,680.00
60.400.902	NAS1-7256-4-Ca1-S	Packing Mat'l for Shipment S163R	560.00
60.400.902	NAS1-7256-4-Ca2-S	Repl. Dwgs. & Specs., Emerg. Suppt.	6,000.00
60.400.790	NAS1-7256-18-E	Systems Engineering	20,000.00
60.400.790	NAS1-7256-18-F	Reliability Program	267,029.50
60.400.934	NAS1-9154-1	Flight Tape Recorder	24,176.00
60.400.931	NAS1-10000-A	Program Management	15,383.00
66.000.075	NAS1-10900-1	LTV Programer SPO, 12 Mos.	186.61
		PRODUCTION SUPPORT SUBTOTAL	$ 375,988.55

SAN MARCO

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
60.400.887	NAS1-5880-5	San Marco Support, 12-mo. Ext.	$ 88,000.00
	NAS1-7256	LTV Shipping	2,219.10
		SAN MARCO SUBTOTAL	$ 90.219.10

TABLE LXXXVIII Concluded - FY 1969 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
SHIPPING			
	NAS1-4794	Aerojet Shipping, Algol Nozzles	$ 1,850.40
	NAS1-5610	LTV Shipping	3,416.20
	NAS1-5883	LTV Shipping	564.40
	NAS1-6020	LTV Shipping	7,801.81
	NAS1-6378	WTR Shipping	56.71
	NAS1-6935	LTV Shipping	213.87
	NAS1-7256	LTV Shipping	5,394.96
	NAS1-10000	LTV Shipping	1,221.98
		SHIPPING SUBTOTAL	$ 20,520.33
		SUPPORTING ACTIVITIES SUBTOTAL	$1,259,893.16
		PHASE V SUBTOTAL	$3,176,023.07
PHASE VI PLANNED			$8,874,903.29
PHASE VII PLANNED			$ 249,003.43
		FY 1969 TOTAL	$12,599,988.00
		01 TOTAL	$10,395,919.01
		02 TOTAL	$ 1,318,083.51
		03 TOTAL	$ 885,985.48

TABLE LXXXIX - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.959	NAS1-3589-22	Completion of Contract	$ 13,778.00
60.400.962	NAS1-3899-17-4	Completion of Contract	298.00
60.400.963	NAS1-4664-24	Overrun	132,818.00
60.400.199	NAS1-4664-25	Final Contract Price Adjustment	1,678.75
60.400.506	NAS1-4664-25	Final Contract Price Adjustment	411.25
60.900.051	NAS1-6935-41	S-144C 42-Inch Heat Shield	66,000.00
		VEHICLES SUBTOTAL	$ 214,984.00
MOTORS (01-02)			
Third Stage			
60.900.100	NAS1-3493-10	Termination	$ 3,709.00
		MOTORS SUBTOTAL	$ 3,709.00
SPARES (01-03)			
60.400.199	NAS1-1970-10	Final Contract Price Adjustment	$ 231.00
		SPARES SUBTOTAL	$ 231.00
MISSION MODS (01-04)			
60.400.962	NAS1-3899-38-3	Completion of Contract	$ 964.00
60.400.962	NAS1-3899-44-2	Completion of Contract	79.00
60.900.003	NAS1-6935-33	Refurbishment of S-144CR	159,972.25
60.900.003	NAS1-6935-33	Diversion of Base A, S-144CR	-5,568.00
		MISSION MODS SUBTOTAL	$ 155,447.25
		HARDWARE SUBTOTAL	$ 374,371.25
-02 SUPPORTING ACTIVITIES			
FIELD SERVICES (02-01)			
WALLOPS STATION			
60.400.960	NAS1-3615-5	Completion of Contract	$ 761.00
		WALLOPS STATION SUBTOTAL	$ 761.00

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
PRODUCTION SUPPORT (02-02)			
60.400.961	NAS1-3657-8	Completion of Contract	$ 16,995.62
60.400.199	NAS1-3657-9	Final Contract Price Adjustment	11,175.00
60.400.962	NAS1-3899-34-3	Completion of Contract	596.00
		PRODUCTION SUPPORT SUBTOTAL	$ 28,766.62
		SUPPORTING ACTIVITIES SUBTOTAL	$ 29,527.62
		PHASE IV SUBTOTAL	$ 403,898.87
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
ADB100	L-15974	Stock Issues	$ 310.86
60.400.443	NAS1-5610-2	2 Scout Vehicles	587,357.30
60.400.621	NAS1-5610-2	2 Scout Vehicles	557,947.77
60.400.443	NAS1-5610	Scout Vehicles	674,180.74
60.400.911	NAS1-7256-5-H	Modifications to D-Section	-559.41
60.400.918	NAS1-7256-5-T	Fabricate 6 Winterization Kits	1,381.80
60.400.902	NAS1-7256-14-Ca5-S	Retest S-169 Guidance System	8,858.00
60.400.902	NAS1-7256-14-Ca6-S	Mods. S-166 D-Sect. Reassign. to 175	7,819.00
60.400.790	NAS1-7256-18-J	Vehicle Processing	779,619.14
60.400.790	NAS1-7256-18-T	Vehicle Processing Hardware	66,293.20
60.400.790	NAS1-7256-18-V	Tooling	68,135.57
60.400.790	NAS1-7256-18(M1)-J	S-166 D-Section	8,700.00
60.400.923	NAS1-7256-18(M3)-H	Install Cork to Base-A Fins	3,010.00
60.900.017	NAS1-7256-18(M10)-H	D-Section Mods.	31,700.00
60.900.020	NAS1-7256-18(M12)-T	Heat Shield Modifications	7,038.00
60.900.902	NAS1-7256-20-Ca15-S	Proc. 10 Scout Base-A Jet Vanes	19,600.00
60.900.023	NAS1-7256-20-Ca18-S	Rework Heat Shields S/N A59 & A401	2,195.00
60.900.101	NAS1-7256-33-Ca36-S	Proc. Long Lead Time Comp., S-144CR	6,388.00
60.400.790	NAS1-7256-35-H	Support to Vehicle Processing	15,657.00
60.400.790	NAS1-7256-35-J	Vehicle Processing	-3,684.00
		VEHICLES SUBTOTAL	$2,841,947.97

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
MOTORS (01-02)			
First Stage			
60.900.048	NAS1-6935-40	Algol IIB Nozzles	$ 500,000.00
60.900.061	NAS1-6935-40	Algol IIB Nozzles	117,000.00
60.900.023	NAS1-7256-33-Ca22-S	Design & Fab. Algol IIB Clos. Assys.	6,307.00
Second Stage			
60.400.902	NAS1-7256-14-Ca9-S	Inspection of Castor II Motors at WTR	2,396.00
60.400.902	NAS1-7256-14-Ca10-S	Inspection of Castor II Motors at WI	2,024.00
60.400.902	NAS1-7256-20-Ca17-S	Insp. Castor II Mtrs. S/N 165 & 178 at WI	1,914.00
60.900.101	NAS1-7256-27-Ca29-S	Inspect. Castor II Motor, S/N 184	2,500.00
60.900.101	NAS1-7256-27-Ca32-S	Crating Castor II Nozzle, S/N 620-017	550.00
60.900.023	NAS1-7256-33-Ca35-S	Inspect. Castor Mtr. Nozz.Tool 906047	396.00
Third Stage			
66.000.038	NAS1-10000-12(M2)-T	Initiators, X-259 Motors	10.34
Fourth Stage			
60.900.038	NAS1-6935-39	Exam. Postfired FW4S Mtr. S/N 30301	2,900.00
60.900.046	NAS1-7256-18(M17)-F	Quality Rep. at UTC, FW-4S	19,043.00
60.400.902	NAS1-7256-27-Ca11-S	20 Explosive Cartridges	27,098.00
60.900.023	NAS1-7256-27-Ca11-S	Explosive Cartridges	492.00
60.900.101	NAS1-7256-27-Ca11-S	20 Explosive Cartridges	17,626.00
		MOTORS SUBTOTAL	$ 700,256.34
MISSION MODS (01-04)			
60.400.808	NAS1-6935-11-6	Deletion Harness E-Section	$ -449.00
60.900.004	NAS1-6935-11-7(M5)	E-Section Modifications	2,881.00
60.400.908	NAS1-6935-11-7	E-Section Modifications	1,805.00
60.900.045	NAS1-6935-45	Mod. Test E-Section S/N 31	4,000.00
60.900.049	NAS1-6935-45	Mod. Test E-Section S/N 31	4,000.00
60.900.074	NAS1-6935-45	Mod. Test E-Section S/N 31	7,400.00
60.900.071	NAS1-6935-48	E-Sect. Marman Clamp, UK4 Bumper Ring	11,430.00
60.400.902	NAS1-7256-4-Ca4-S	Des. & Fab. 2 SM Protective Barriers	-403.00
60.400.939	NAS1-7256-18(M6)-J	Instrumented E-Section	66,795.00
60.900.029	NAS1-7256-19-J	E-Sect. Instrumentation	30,000.00
60.900.040	NAS1-7256-19-J	E-Sect. Instrumentation	24,650.00
60.400.902	NAS1-7256-20-Ca13-S	Mods. S-177 for GRP-A P/L Anten.Mt.	1,519.00
		MISSION MODS SUBTOTAL	$ 153,628.00

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
SHIPPING			
VEHICLES			
	NAS1-6935	LTV Shipping	$ 42.63
	NAS1-7256	LTV Shipping	154.62
MOTORS			
First Stage			
	NAS1-5610	LTV Shipping	9,500.80
	NAS1-6935-40	LTV Shipping	3,033.60
	NAS1-6935	LTV Shipping	739.11
	NAS1-7256	LTV Shipping	7,543.70
Second Stage			
	NAS1-5610	LTV Shipping	540.80
	NAS1-7256	LTV Shipping	5,946.59
Third Stage			
	NAS1-5610	LTV Shipping	540.80
	NAS1-5883	LTV Shipping	20.14
	NAS1-7256	LTV Shipping	6,719.37
Fourth Stage			
	NAS1-5592	LTV Shipping	11.00
	NAS1-5610	LTV Shipping	591.60
	NAS1-6935	LTV Shipping	394.57
	NAS1-7256	LTV Shipping	3,042.45
SPARES			
	NAS1-7256	LTV Shipping	169.05
		SHIPPING SUBTOTAL	$ 38,990.83
		HARDWARE SUBTOTAL	$3,734,823.14

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
DCASO			
OSS DIRECT			$ 118,000.00
		DCASO SUBTOTAL	$ 118,000.00
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER			
46.200.129	L-38001	Fig. Preparation for Scout Reports	$ 2,448.00
52.320.104	L-42743	In-House, LRC	1,747.60
60.900.086	L-44769	Magnafax Supplies	107.35
52.340.056	L-46987	In-House, LRC	26,054.80
52.340.056	L-46987-1	In-House, LRC	200.00
40.101.028	L-47271	Tool Services, LRC	378.10
40.101.028	L-47974	Tool Services, LRC	179.10
12.750.664	L-49093	In-House, LRC	8,882.80
11.230.846	L-51918	In-House, LRC	2,650.00
12.750.700	L-52203	In-House, LRC	2,856.00
60.900.130	L-52956	Magnetic Tape Cartridges	138.27
52.310.134	L-55447	In-House, LRC	12,455.10
60.900.182	L-58557	Drafting Machine; Scales	168.35
60.900.183	L-58561	Compasses, Drafting	22.56
52.420.991	L-59408	Adhesive	58.50
66.000.103	L-70776	Office Furniture, 1192-E	15,961.12
66.000.104	L-70777	Office Chairs, 1192-E	6,587.68
66.000.107	L-71083	Furniture, 1192-E	3,734.55
66.000.105	L-71933	Bulletin Boards, 1192-E	358.09
66.000.119	L-72437	Equipment, 1192-E	145.53
66.000.118	L-72448	Furniture, 1192-E	446.20
66.000.139	L-73616	Office Furniture, 1192-E	614.75
66.000.140	L-73617	Office Chairs, 1192-E	555.40
66.000.141	L-73987	Conservafiles, 1192-E	2,588.16
66.000.131	L-74262	Chalk and Bulletin Boards, 1192-E	306.45
66.000.131	L-74263	Chalk and Bulletin Boards, 1192-E	1,337.74
66.000.143	L-74616	Furniture, 1192-E	80.36
66.000.153	L-75016	Painting Office Equip., 1192-E	1,271.05
66.000.159	L-75016-1	Painting Office Equip., 1192-E	74.20
66.000.019	L-75016-2	Painting Office Equip., 1192-E	167.18
66.000.158	L-75562	Overhead Projector, 1192-E	271.22
66.000.161	L-75662	Magazine File	17.75
66.000.161	L-75663	Cabinet	196.95

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

PHASE V Continued

-02 SUPPORTING ACTIVITIES Continued

FIELD SERVICES (02-01) Continued

LANGLEY RESEARCH CENTER Continued

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
66.000.167	L-77087	Secretary Chairs, 1192-E	$ 156.44
66.000.167	L-77088	Secretary Chairs, 1192-E	78.70
66.000.169	L-77604	Modular Cabinet, 1192-E	11.92
66.000.176	L-77951	Riser for 3M Printer	237.63
66.000.190	L-79800	Desks, 2, 1192-E	347.12
66.000.192	L-79800	Desk, 1192-E	179.87
40.101.028	L0252220096	Tool Services, LRC	560.00
40.101.031	L0452230581	In-House, LRC	760.00
40.101.034	L0852230760	In-House, LRC	417.90
52.230.806	L0952230806	In-House, LRC	585.00
40.101.032	L1852220413	In-House, LRC	280.00
40.101.034	L1852230767	In-House, LRC	1,160.00
40.101.034	L1852230768	In-House, LRC	980.00
66.000.114	OL-71787	Office Furniture, 1192-E	509.22
66.000.121	OL-73726	Lectern, Large	925.00
56.130.202	OL-74084	Window Covering, 1192-E	540.54
56.130.290	OL-74126	Install Draperies, 1192-E	706.00
56.130.427	OL-74126-1	Install Draperies, 1192-E	196.00
66.000.162	OL-74981	Pilot Strip, 1192-E	88.50
66.000.170	OL-76863	Furniture, 1192-E	169.90
66.000.186	OL-77345	Slide Projector Lamps	33.41
66.000.175	OL-77400	Directional Signs, 1192-E	84.46
66.000.183	OL-77585	Push-pins	34.56
66.000.180	OL-77845	Board for Projection Room, 1192E	108.00
66.000.177	OL-77855	Slide Tray	49.68
66.000.178	OL-77856	Transparencies	107.15
56.130.570	OL-78273	Install Pencil Sharpeners, etc.,1192-E	190.00
66.000.202	OL-79570	Costumers, 1192-E	16.83
66.000.201	OL-80204	Wall Covering, 1192-E	47.27
60.900.083	80330100930-082	Arch Board File	7.80
60.900.083	80330100930-083	Arch Board File	2.76
60.400.790	NAS1-7256-5-P	Langley Support	278,240.85
12.750.723	NAS1-7947-9	In-House, LRC	35,000.00
12.700.082	NAS1-7947-12	In-House, LRC	49,461.00
51.240.114	NAS1-8330	In-House, LRC	93.28
57.000.004	NAS1-8348	In-House, LRC	210.08
56.130.533	NAS1-9057-58	In-House, LRC	105.00
56.130.533	NAS1-9057	In-House, LRC	300.55
46.200.132	NAS1-9066-124	Preparation of LWP-804	1,378.91

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01) Continued			
LANGLEY RESEARCH CENTER Continued			
46.200.132	NAS1-9066-140	Figure Preparation	$ 363.73
46.200.132	NAS1-9066-519	Vu-Graphs	35.73
57.000.011	NAS1-9933	In-House, LRC	5,000.00
56.330.547	NAS1-10695-3	Scout Offices, 1192-E	138.88
56.330.601	NAS1-10695-4	Scout Offices, 1192-E	246.42
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 473,207.60
WALLOPS STATION			
ADB100	L-15974	Stock Issues	$ 294.29
56.130.913	L-30895-33	Anodizing Aluminum Plate	37.99
56.130.011	L-30895-34	Wire Pendant	269.21
60.900.027	L-41644	Books	80.56
60.900.032	L-43254	Motor Shipments, Recording Device	513.72
60.900.041	L-43727	Sheet of Pegboard	7.88
52.340.174	L-46146	Spin Balance Tables	1,805.03
60.900.093	L-50465	Accelerometer	1,124.23
60.900.103	L-50848	Hydraulic Fittings	86.66
52.330.136	L-51744	Vacuum Gage	298.00
52.330.131	L1752330131	Vacuum Tubing	156.25
60.400.790	NAS1-7256-5-N	Wallops Island Support	730,372.00
60.900.044	NAS1-7256-16-N	Retransfer Expenses for WI Prsnl.	27,037.00
66.000.031	NAS1-10650	Reflectoscopes	8.82
	Suballotment Wallops		85,000.00
		WALLOPS STATION SUBTOTAL	$ 847,091.64
WESTERN TEST RANGE			
60.005.001	L-52043	Typewriter, Electric	$ 927.00
60.900.033	L-84994-3	Motor Storage at NAD, Hawthorne, Nev.	2,000.00
60.900.092	L-84994-4	Motor Storage at NAD, Hawthorne, Nev.	2,000.00
60.900.185	L-84994-5	Motor Storage at NAD, Hawthorne, Nev.	2,000.00

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01) Continued			
WESTERN TEST RANGE Continued			
60.900.056	NAS1-6935-47	Prep. Std. Handling Proced.Man.NAD	$ 8,000.00
60.900.091	NAS1-6935-47	Prep. Std. Handling Proced.Man.NAD	5,600.00
60.900.055	NAS1-7256-21-N	50% VAFB Launch Serv. 7/1/70-11/1/70	37,907.00
	Suballotment WTR		50,000.00
		WESTERN TEST RANGE SUBTOTAL	$ 108,434.00
PRODUCTION SUPPORT (02-02)			
ADB100	L-15974	Stock Issues	$ 2,584.92
60.900.024	L-42376	Scout Training & Info. Program	1,384.00
60.900.066	L-46232	Gas Booster Pump	750.00
60.900.067	L-46624	Lockheed Engineer for TOLIP	1,735.00
52.310.193	L-56423	Connectors	130.16
60.900.013	NAS1-5592-17	Overhead Rate Adjustment	23,776.00
60.900.002	NAS1-6935-32	Revisions to Scout SOP	42,575.00
60.900.002	NAS1-6935-32-2	Revisions to Scout SOP	-711.00
60.900.014	NAS1-6935-35	Mod. GSE to Accomm. SBASI in Veh.	29,500.00
60.900.026	NAS1-6935-38	Shelf Life Ext. FW-4S Motors	84,000.00
60.900.140	NAS1-6935-41-4(M3)	Scout-D Wind Tunnel Test Data	50,000.00
60.900.144	NAS1-6935-41-4(M3)	Wind Tunnel Test Data & FW4S Case	11,420.00
60.900.054	NAS1-6935-43	3rd,4th,5th-Stg. Motor Shelf Life Study	15,602.00
60.900.070	NAS1-6935-49	Sep. Sys. Test Planning Guide Manual	6,000.00
60.900.095	NAS1-6935-49	Sep. Sys. Test Planning Guide Manual	4,490.00
60.400.902	NAS1-7256-4-Ca1-S	Prepare S-163 for Shipment	-28.00
60.400.902	NAS1-7256-4-Ca2-S	Replace Drawings and Specs.	-400.00
60.400.902	NAS1-7256-4-Ca3-S	Initiators	76,512.00
60.400.790	NAS1-7256-5-A	Program Management	871,180.61
60.400.790	NAS1-7256-5-B	Payload Coordination	132,353.90
60.400.790	NAS1-7256-5-C	Preflight Planning	66,985.00
60.400.790	NAS1-7256-5-D	Data Reduction and Analysis	250,032.93
60.400.790	NAS1-7256-5-G	Standardization and Config. Control	469,304.00
60.400.902	NAS1-7256-14-Ca7-S	Test 4th-Stg. Limiting Resistor Box	6,524.00
60.400.902	NAS1-7256-14-Ca8-S	Eval. Tests Ignition Sys. Circuits	7,178.00
60.900.012	NAS1-7256-18(M8)-E	Incorp. Instr. for SBASI Flt. Eval.	19,071.00
60.900.015	NAS1-7256-18(M9)-E	Ignition Mods.	14,416.00
60.400.790	NAS1-7256-18-C	Preflight Planning	62,632.29
60.400.790	NAS1-7256-18-E	Systems Engineering	-40,890.83

TABLE LXXXIX Continued - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORT ACTIVITIES Continued			
PRODUCTION SUPPORT (02-02) Continued			
60.400.790	NAS1-7256-18-F	Reliability Program	$ 637,099.40
60.400.790	NAS1-7256-18-G	Standardization & Config. Control	34,138.78
60.400.790	NAS1-7256-18-W	Certification Training Program	-2,418.86
60.400.902	NAS1-7256-20-Ca12-S	Fabrication of Scout Test Cables	4,081.00
60.400.023	NAS1-7256-20-Ca19-S	X-258, X-259 Ign. Shelf Life Prog.	10,195.00
60.400.902	NAS1-7256-23-Ca8-S	Eval. Tests Ign. Sys. Circuits	-2,268.00
60.400.902	NAS1-7256-27-Ca16-S	Flt. Instr. 14 3-lb Roll Motors	13,426.00
60.900.023	NAS1-7256-27-Ca16-S	Flt. Instr. 14 3-lb Roll Motors	22,074.00
60.900.101	NAS1-7256-27-Ca16-S	Flt. Instr. 14 3-lb Roll Motors	-2,000.00
60.900.023	NAS1-7256-27-Ca24-S	Heat Shield Negative Pressure Tests	-766.00
60.900.023	NAS1-7256-27-Ca25-S	X-258 Igniter Shelf Life Prog.	-2,062.00
60.400.902	NAS1-7256-33-Ca14-S	Inspect T/M Pkg. & Transmitter	250.00
60.400.790	NAS1-7256-35-B	Payload Coordination	9,357.00
60.400.790	NAS1-7256-35-C	Preflight Planning	-35,406.00
60.400.790	NAS1-7256-35-D	Data Reduction & Analysis	-92,706.00
52.230.961	NAS1-9043-1	Model for Jet Vane Tests	830.42
60.400.931	NAS1-10000-E	Systems Engineering	432.00
66.000.075	NAS1-10900-1	LTV Programer SPO, 12 Months	1.45
		PRODUCTION SUPPORT SUBTOTAL	$ 2,802,365.17
LOGISTICS (02-03)			
60.400.790	NAS1-7256-18-L	Logistics Support Management	$ 308,653.64
		LOGISTICS SUBTOTAL	$ 308,653.64
SAN MARCO			
ADB100	L-15974	Stock Issues	$ 25.53
60.900.047	NAS1-5880-6	San Marco through April 1970	83,850.00
	NAS1-5880	LTV Shipping	21,780.06
	NAS1-7256	LTV Shipping	2,458,81
	NAS1-10000	LTV Shipping	13.50
OSS DIRECT		SAS-A Launch Costs	547,000.00
		SAN MARCO SUBTOTAL	$ 655,127.90

TABLE LXXXIX Concluded - FY 1970 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
SHIPPING			
	L-46232	Teledyne Shipping	$ 33.50
	L-47001	Wallops Shipping	3,260.00
	L-75663	Langley Shipping	9.45
	NAS1-6020	LTV Shipping	132.04
	NAS1-6378	LTV Shipping	21.28
	NAS1-6935-41	LTV Shipping	8.17
	NAS1-6935	LTV Shipping	34.01
	NAS1-7256	LTV Shipping	23,893.35
	NAS1-10000	LTV Shipping	2,022.43
		SHIPPING SUBTOTAL	$ 29,414.23
		SUPPORTING ACTIVITIES SUBTOTAL	$ 5,342,294.18
		PHASE V SUBTOTAL	$ 9,077,117.32
PHASE VI PLANNED			$ 2,995,745.05
PHASE VII PLANNED			$ 1,222,899.38
		FY 1970 TOTAL	$13,699,660.62
		-01 TOTAL	$6,259,821.94
		-02 TOTAL	$5,818,677.91
		-03 TOTAL	$1,621,160.77

TABLE XC - FY 1971 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.931	NAS1-10000-17-V	Tooling and GSE Maintenance	$ 2,489.43
60.400.931	NAS1-10000-H	Vehicle Processing	112,997.00
60.400.931	NAS1-10000-R-2	S-144 PAET Reentry	961.00
60.400.931	NAS1-10000-V	Tooling and GSE Maintenance	26,467.57
		VEHICLES SUBTOTAL	$ 142,915.00
SPARES (01-03)			
60.400.931	NAS1-10000-M	Spares	$ 26,787.00
		SPARES SUBTOTAL	$ 26,787.00
		HARDWARE SUBTOTAL	$ 169,702.00
-02 SUPPORTING ACTIVITIES			
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER			
60.400.931	NAS1-10000-P	Langley Support	$ 20,348.00
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 20,348.00
WALLOPS STATION			
60.400.557	NAS1-6020-3-M	Wallops Island Field Team	$ 600.00
		WALLOPS STATION SUBTOTAL	$ 600.00
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-A	Program Management	$ 139,126.00
60.400.931	NAS1-10000-B	Payload Coordination	21,681.00
60.400.931	NAS1-10000-C	Preflight Planning	23,928.00
60.400.931	NAS1-10000-D	Data Reduction and Analysis	44,150.00
60.400.931	NAS1-10000-F	Reliability Program	69,055.00
60.400.931	NAS1-10000-G	Standardization & Config. Cont.	27,584.00
60.400.931	NAS1-10000-K	Certification Training	19.00
60.400.931	NAS1-10000-R-2	S-144 PAET Reentry	68,933.00
		PRODUCTION SUPPORT SUBTOTAL	$ 394,476.00

TABLE XC Continued - FY 1971 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES Continued			
LOGISTICS (02-03)			
60.400.931	NAS1-10000-L	Logistics Support Management	$ 28,988.00
		LOGISTICS SUBTOTAL	$ 28,988.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 444,412.00
-03 PRODUCT IMPROVEMENT			
42-INCH HEAT SHIELD			
66.000.024	NAS1-6935-41-7(5)	Add. of Door to 42-In. H.S.	$ 3,254.00
		LARGE HEAT SHIELD SUBTOTAL	$ 3,254.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ 3,254.00
		PHASE IV SUBTOTAL	$ 617,368.00
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.557	NAS1-6020-5-H	Support to Vehicle Checkout	$ 2,217.24
60.900.068	NAS1-7256-22-V	Fabricate Master Drill Tools	3,284.00
60.900.078	NAS1-7256-22-V	Replace GSE Servo Analyzer	21,346.00
60.900.139	NAS1-7256-26-V	Tooling	1,660.00
66.000.013	NAS1-10000-9-Ca14-S	Mod. A-63 Heat Shield	532.00
66.000.055	NAS1-10000-19-Ca9-S	Reprocessing Vehicle S-170	130,000.00
60.400.931	NAS1-10000-17-V	Tooling and GSE Maintenance	57,914.00
60.400.931	NAS1-10000-H	Vehicle Processing	2,836.00
		VEHICLES SUBTOTAL	$ 219,789.24
MOTORS (01-02)			
First Stage			
60.900.023	NAS1-7256-27-Ca26-S	Inspect Algol IIB Motor, S/N 55	$ 18,925.00
60.900.101	NAS1-7256-27-Ca26-S	Inspect Algol IIB Motor, S/N 55	-1,777.00
66.000.013	NAS1-10000-16-Ca5-S	Tool for Rocket Motor Igniter	11,203.00

TABLE XC Continued - FY 1971 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
MOTORS (01-02) Continued			
Second Stage			
60.900.101	NAS1-7256-27-Ca29-S	Inspect Castor II Motor, S/N 184	$ -73.00
60.900.101	NAS1-7256-27-Ca32-S	Crating Castor II Noz., S/N 620-017	-70.00
66.000.013	NAS1-10000-9-Ca1-S	Inspec. Castor IIA Mts.S/N's 181,182,183	2,686.00
66.000.013	NAS1-10000-16-Ca16-S	Inspec. Castor II Mtr., S/N 187 at WI	2,240.00
Third Stage			
66.000.013	NAS1-10000-16-Ca15-S	X-ray X-259 Motor HIB-303 at ABL	4,028.00
Fourth Stage			
66.000.013	NAS1-10000-9-Ca4-S	Provide RMS finish on FW-4S Comp.	2,740.00
		MOTORS SUBTOTAL	$ 39,902.00
SPARES (01-03)			
60.400.729	NAS1-6020-38-Ca60-L	Procurement of Spares	$ 4,416.00
60.400.931	NAS1-10000-M	Spares	53,571.00
		SPARES SUBTOTAL	$ 57,987.00
MISSION MODS (01-04)			
66.000.017	L-58462	Ship Material to Africa	$ 187.21
66.000.016	L-58465	Ship. Vans and Matl. to Africa	3,593.75
66.000.058	L-63688	Shipment S-173 Separation System	790.71
66.000.061	L-64916	Material Shipment to Africa	5,000.00
60.900.127	NAS1-7256-33-Ca33-S	Fab. SOLRAD-C P/L Protec. Shield	-152.00
60.900.023	NAS1-7256-33-Ca34-S	Prep. Transit D for 42-In.Stat.Ld.Tst.	2,475.00
60.900.101	NAS1-7256-33-Ca37-S	Special Instrumentation	17,554.00
60.400.931	NAS1-10000-7-J	San Marco	200,000.00
66.000.013	NAS1-10000-9-Ca3-S	Rework San Marco Separation System	11,604.00
66.000.013	NAS1-10000-14-Ca7-S	GSE Mods Required to Support SAS-B Ops.	5,500.00
66.000.055	NAS1-10000-19-Ca9-S	Recertification S-170	2,650.00
60.400.931	NAS1-10000-R-3	S-173 Recheckout	34,578.00
60.400.931	NAS1-10000-R-8	Spec., Sys., & Compons. Checkouts, S-166	6,352.50
		MISSION MODS SUBTOTAL	$ 290,133.17

TABLE XC Continued - FY 1971 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-01 HARDWARE Continued			
SHIPPING			
VEHICLES			
	NAS1-7256	LTV Shipping	$ 30.41
MOTORS			
Second Stage			
	NAS1-7256	LTV Shipping	17.64
Third Stage			
	NAS1-6935	LTV Shipping	3,395.80
	NAS1-10000	LTV Shipping	1,579.34
Fourth Stage			
	NAS1-6935	LTV Shipping	1,594.86
	NAS1-7256	LTV Shipping	8,489.29
	NAS1-9325	ABL Shipping	136.80
	NAS1-10000	LTV Shipping	813.30
	NAS1-10481	ABL Shipping	207.62
MISSION MODS			
	NAS1-5880	Shipping to San Marco	51,939.00
		SHIPPING SUBTOTAL	$ 68,204.06
		HARDWARE SUBTOTAL	$ 676,015.47
-02 SUPPORTING ACTIVITIES			
DCASO			
OSS DIRECT			$ 112,000.00
		DCASO SUBTOTAL	$ 112,000.00
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER			
ADB100	L-15974	Stock Issues	$ 397.89
ADB100	L-15974	Stock Issues, In-House, LRC	7,109.43
52.210.691	L-54154	In-House, LRC	3,168.00
62.500.369	L-54749	Water Quenching Study, FW-4S Motor	2,450.00
52.420.991	L-59408	Adhesive	3.55

TABLE XC Continued - FY 1971 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01) Continued			
LANGLEY RESEARCH CENTER Continued			
66.000.084	L-68850	Electric Calculator	$ 352.75
66.000.103	L-70776	Furniture, 1192-E	129.70
66.000.215	L-80112	Painting Office Equipment, 1192-E	58.05
66.000.211	L-80802	Bookcases, 1192-E	102.90
66.000.212	L-81694	Folders, 1192-E	116.12
47.000.011	L0152410367	In-House, LRC	233.82
47.000.013	L0352220683	In-House, LRC	1,925.00
40.101.040	L0352220881	In-House, LRC	1,225.00
47.000.016	L0452220818	In-House, LRC	600.00
52.230.179	L0552230179	In-House, LRC	174.12
40.101.039	L0952220768	In-House, LRC	245.00
47.000.011	L4752220514	In-House, LRC	730.00
66.000.200	OL-79632	Wall Covering, 1192E	498.00
11.000.266	NAS1-6090-92	In-House, LRC	31,000.00
46.200.132	NAS1-9066-361	In-House, LRC	356.75
46.200.284	NAS1-9788-533	In-House, LRC	105.00
46.200.284	NAS1-9788-570	In-House, LRC	6.50
46.200.284	NAS1-9788	In-House, LRC	553.97
52.410.837	NAS1-9789	In-House, LRC	150,000.00
60.400.931	NAS1-10000-P	Langley Support	40,697.00
52.110.328	NAS1-10363	In-House, LRC	11,688.00
52.210.569	NAS1-10369	In-House, LRC	4,052.50
52.220.185	NAS1-10380	In-House, LRC	22,998.00
52.220.116	NAS1-10381	In-House, LRC	8,149.00
52.210.580	NAS1-10407	In-House, LRC	8,950.00
52.310.135	NAS1-10415	In-House, LRC	4,020.00
52.310.130	NAS1-10419	In-House, LRC	3,195.72
52.210.575	NAS1-10449	In-House, LRC	11,055.00
52.310.131	NAS1-10519	In-House, LRC	6,740.00
52.110.318	NAS1-10612	In-House, LRC	8,569.00
57.110.693	NAS1-10648	In-House, LRC	3,860.00
52.110.323	NAS1-10659	In-House, LRC	8,675.00
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 344,190.77
WALLOPS STATION			
ADB100	L-15974	Stock Issues	$ 1,843.41
66.000.030	L-44758	Fram	3.76
66.000.032	L-59683	Purolators	86.39
52.230.348	L-1852230348	Beam Plate	248.00
66.000.033	OL-59819	Valves	60.45
60.400.931	NAS1-10000-N	Field Services Support	802,000.00
66.000.031	NAS1-10650	Reflectoscopes	5,653.33
60.400.931	NAS1-10000-R-17	Equipment Inventory at Wallops	1,571.08
	Suballotment Wallops		75,000.00
		WALLOPS STATION SUBTOTAL	$ 886,466.42

TABLE XC Continued - FY 1971 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01) Continued			
WESTERN TEST RANGE			
60.900.134	L-52073	FY71 Ops. & Maint. Expend., WTR	$ 8,911.50
60.000.022	L-58934	Property Tags	226.92
66.000.064	L-66100	Microfilm Printer for WTR	8,387.88
66.000.064	L-71168	Maint.Serv. for Microfilm Printer, WTR	283.35
66.000.047	NAS1-10000-12(M11)-N	LTV Ground Transportation, VAFB	11,151.46
66.000.056	NAS1-10000-12(M11)-N	LTV Ground Transportation, VAFB	26,000.00
60.400.931	NAS1-10000-N	Field Services Support	501,000.00
60.400.931	NAS1-10000-R-17	Equipment Inventory at WTR	1,571.09
66.000.031	NAS1-10650	Reflectoscopes	5,665.00
66.000.066	NAS1-11067	Band Saw for WTR-LTV	5,921.00
	Suballotment WTR		50,000.00
		WESTERN TEST RANGE SUBTOTAL	$ 619,118.20
PRODUCTION SUPPORT (02-02)			
ADB100	L-15974	Stock Issues	$ 1,128.38
60.900.173	L-56501	Calculator	10,128.60
66.000.003	L-56966	Shipment of Scout Vehicle	12,831.59
60.900.175	L-58023	Printer, Dry	16,720.55
66.000.014	L-58134	Conservafile	126.08
66.000.019	L-58484	Navy Services, Ship. Mat'l to Africa	3,982.96
66.000.018	L-58808	Microforms Reader	607.75
66.000.036	L-62709	Microfilm Processor-Camera	11,566.84
60.900.175	L-71168	Dry Silver Printer	1,486.67
66.000.036	L-71168	Processor, Camera	-140.33
60.400.557	NAS1-6020-E	Systems Engineering	180.49
60.400.790	NAS1-7256-18-E	Systems Engineering	5,082.00
60.900.101	NAS1-7256-27-Ca24-S	Heat Shield Negative Press. Test.	1,800.00
60.900.101	NAS1-7256-27-Ca28-S	Castor II Shelf Life Extension	-4,935.00
60.900.088	NAS1-7256-30(M24)-G	Rev. Vol. III Rocket Motor Manual	17,815.00
60.000.006	NAS1-7256-30(M24)-G	Reconstruction of SOP, Vol. III	7,323.00
60.900.023	NAS1-7256-33(M20-Ca19)-S	X-258,X-259 Ign. Shelf Life Pgm.	-1,400.00
60.900.101	NAS1-7256-33-Ca14-S	Inspect T/M Pkg. & Transmitter	1,922.00
60.900.023	NAS1-7256-33-Ca20-S	X-258 Ign. Shelf Life Verification	-19,000.00
60.900.101	NAS1-7256-33-Ca38-S	Reprod. Doc. Pert. to Apollo Invest.	408.00
60.400.882	NAS1-7256-34	Incentive Award, NAS1-7256	425,000.00
60.400.790	NAS1-7256-35-D	Data Reduction and Analysis	-334,864.00
66.000.013	NAS1-10000-9-Ca10-S	Castor II Shelf Life Ext. Pgm. & Ag.	12,164.00
66.000.013	NAS1-10000-9-Ca12-S	Purging of S-166	3,053.00
60.400.062	NAS1-10000-17(M15)-T	Fourth-Stage Ign. and T/M Systems	26,191.66
60.400.931	NAS1-10000-A	Program Management	262,869.00
60.400.931	NAS1-10000-B	Payload Coordination	33,689.00
60.400.931	NAS1-10000-C	Preflight Planning	28,770.00
60.400.931	NAS1-10000-D	Data Reduction and Analysis	285,850.00
60.400.931	NAS1-10000-E	Systems Engineering	101,015.11
60.400.931	NAS1-10000-F	Reliability Program	138,112.00
60.400.931	NAS1-10000-G	Standardization & Config. Control	55,166.00
60.400.931	NAS1-10000-K	Certification Training	1,500.00
60.400.931	NAS1-10000-R-14	Scout Vehicle Simulator	19,117.00
60.400.931	NAS1-10000-R-26	Des. Imp. and Test Scout N2 Reqltrs.	2,651.00
60.400.931	NAS1-10000-R	Special Programs	17,443.08
60.900.119	NAS1-10483	Tech. Support by Hercules/Bacchus	89,694.00
66.000.075	NAS1-10900-1	LTV Programmer SPO, 12 Months	19,811.94
		PRODUCTION SUPPORT TOTAL	$1,254,867.37

TABLE XC Concluded - FY 1971 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
LOGISTICS (02-03)			
60.400.931	NAS1-10000-L	Logistics Support Management	$ 57,975.00
		LOGISTICS SUBTOTAL	$ 57,975.00
SAN MARCO			
66.000.081	OL-67020	Return of Ship. Contnrs.,S175	$ 96.76
60.900.167	NAS1-5880-8	Increase in Material Effort	25,000.00
66.000.013	NAS1-10000-9-Ca2-S	Packaging & Crating San Marco-C	989.00
60.400.931	NAS1-10000-17-J	San Marco Support	100,000.00
60.400.931	NAS1-10000-J	San Marco Support	107,000.00
OSS DIRECT		SSS-A Launch Costs	547,000.00
		SAN MARCO SUBTOTAL	$ 780,085.76
SHIPPING			
	NAS1-5880	LTV Shipping	$ 40,734.82
	NAS1-6020	LTV Shipping	30.27
	NAS1-6378	WTR Shipping	24.99
	NAS1-6935	LTV Shipping	121.86
	NAS1-7256	LTV Shipping	13,105.59
	NAS1-10000	LTV Shipping	8,349.47
		SHIPPING SUBTOTAL	$ 62,367.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 4,117,070.52
		PHASE V SUBTOTAL	$ 4,793,085.99
PHASE VI PLANNED			$ 3,692,173.20
PHASE VII PLANNED			$ 4,096,437.46
		FY 1971 TOTAL	$13,199,064.65
		-01 TOTAL	$4,333,002.70
		-02 TOTAL	$7,609,965.63
		-03 TOTAL	$1,256,096.32

TABLE XCI - FY 1972 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.931	NAS1-10000-17-E	Systems Engineering	$ 124,650.00
60.400.931	NAS1-10000-17-K	Certification Training	1,112.00
60.400.931	NAS1-10000-30-R-2	S-144 PAET Reentry	2,072.00
66.000.029	NAS1-10000-30-R	Special Programs	13,873.00
		PRODUCTION SUPPORT SUBTOTAL	$ 141,707.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 141,707.00
		PHASE IV SUBTOTAL	$ 141,707.00
PHASE V			
-01 HARDWARE			
MISSION MODS (01-04)			
66.000.108	L-71986	Shipment of S-163 to Africa	$ 11,781.00
66.000.117	NAS1-6935-51	UK-4 Payload Test Support	1,600.00
66.000.123	NAS1-6935-51	UK-4 Payload Test Support	1,798.00
60.400.931	NAS1-10000-12-R-8	Spec., Sys., Comp. Tests S-166	25,900.75
60.400.931	NAS1-10000-12-R-9	Rework and Retest S-163	15,040.00
66.000.074	NAS1-10000-19-Ca9-S	Instrumentation for S-170	3,200.00
		MISSION MODS SUBTOTAL	$ 59,319.75
		HARDWARE SUBTOTAL	$ 59,319.75
-02 SUPPORTING ACTIVITIES			
FIELD SERVICES (02-01)			
LANGLEY RESEARCH CENTER			
ADB	L-15974	Stock Issues	$ 1,072.41
66.000.086	L-68372	Dry Silver Paper	49.58
66.000.130	L-70313	Book	11.25
66.000.101	L-70899	Dry Silver Paper	148.44
66.000.134	L-73220	Filing Cb. & Top, 1192E	156.39
66.000.131	L-73450	Dry Silver Paper	514.84

TABLE XCI Continued - FY 1972 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
FIELD SERVICES (02-01) Continued			
LANGLEY RESEARCH CENTER Continued			
66.000.136	L-75239	Moving Charges on Printer & Camera	$ 144.00
66.000.193	L-80112	Painting Equipment, 1192-E	69.43
47.000.028	L0452220277	In-house, LRC	1,000.00
47.000.023	L0652220074	In-house, LRC	437.00
47.000.021	L0852260982	In-house, LRC	216.00
47.000.023	L1852410857	In-house, LRC	520.00
47.000.024	L4552420426	In-house, LRC	41.79
56.130.371	OL-76223	Boards and Pictures, 1192E	60.00
66.000.166	OL-76282	Projector Lamps, 1192E	98.70
52.420.683	OL-76574	Scout Sign for 1192E	35.00
52.102.054	OL-79013	Paint, 1192E	22.60
66.000.217	OL-81070	Costumers, 1192E	28.29
56.130.703	NAS1-11256	Equipment, 1192E	297.35
		LANGLEY RESEARCH CENTER SUBTOTAL	$ 4,923.77
WALLOPS STATION			
ADB100	L-15974	Stock Issues	$ 583.38
66.000.089	L-68848	Rental of Copier	150.50
66.000.093	L-69532	Polaroid Film	60.00
66.000.129	L-71225	Butler Buildings for Mtr.Dolly Strg.	16,544.00
66.000.115	L-71779	Rental of Copier	157.50
11.230.047	L-73421	Digital Magnetic Tapes	180.00
20.200.637	NAS1-3899-1	Final Payment on Task Order	2.00
60.400.931	NAS1-10000-12-R-24	Replacement of GFE Cables	340.00
60.400.931	NAS1-10000-R-24	Replacement of GFE Cables	15.00
	Suballotment Wallops		50,000.00
		WALLOPS STATION SUBTOTAL	$ 68,032.38
WESTERN TEST RANGE			
66.000.065	L-64709	FY72 Ops. & Maint. Expend.,WTR*	$ 5,375.00
60.400.931	NAS1-10000-17-N	Field Services Support	546,000.00
60.400.931	NAS1-10000-24-N	Field Services Support	276,145.00
		WESTERN TEST RANGE SUBTOTAL	$ 827,520.00

---

*E04ACFC70 ÷ $10,750.00.

TABLE XCI Concluded - FY 1972 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V Continued			
-02 SUPPORTING ACTIVITIES Continued			
PRODUCTION SUPPORT (02-02)			
66.000.091	L-69095	Shipment of S-163 Motors	$ 3,799.29
66.000.148	L-74595	Trans. Charges, Photo Equip.	104.84
66.000.111	OL-71146	Film for SSS-A Launch	57.12
66.000.095	NAS1-6835-12-5	Dev. of EX-38 Pressure Cartridges	13,521.00
60.400.931	NAS1-10000-12-C	Preflight Planning	45,836.00
60.400.931	NAS1-10000-12-R-10	Refurb. Misc. Comps. from S-144	13,335.00
60.400.931	NAS1-10000-12-R-14	Scout Vehicle Simulator	5,324.00
60.400.931	NAS1-10000-12-R	Special Programs	18.00
60.400.931	NAS1-10000-17-B	Payload Coordination	2,284.00
60.400.931	NAS1-10000-17-C	Preflight Planning	60,000.00
60.400.931	NAS1-10000-17-D	Data Reduction and Analysis	7,045.00
60.400.931	NAS1-10000-17-K	Certification Training	763.00
60.400.931	NAS1-10000-R-14	Scout Vehicle Simulator	5,802.00
60.400.931	NAS1-10000-R-26	Des. Imp. and Test, Scout N2 Regs.	20,538.00
		PRODUCTION SUPPORT SUBTOTAL	$ 178,427.25
SAN MARCO			
60.400.931	NAS1-10000-12-J	San Marco Support	$ 70,040.00
OSS DIRECT		SAS-B Launch Costs	597,000.00
		SAN MARCO SUBTOTAL	$ 667,040.00
SHIPPING			
	L-77088	LRC Shipping	$ 13.88
	NAS1-7256	LTV Shipping	1,335.72
	NAS1-10000	LTV Shipping	131.31
		SHIPPING SUBTOTAL	$ 1,480.91
		SUPPORTING ACTIVITIES SUBTOTAL	$1,747,424.31
		PHASE V SUBTOTAL	$1,806,744.06
PHASE VI PLANNED			$8,875,319.35
PHASE VII PLANNED			$3,679,229.59
		FY 1972 TOTAL	$14,503,000.00
		-01 TOTAL	$4,497,033.95
		-02 TOTAL	$9,840,718.05
		-03 TOTAL	$165,248.00

TABLE XCII - FY 1973 NASA PRODUCTION EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
20.200.004	NAS1-2650-13	Final Contract Price Adjustment	$ 34,754.00
60.400.199	NAS1-3589-23	Final Contract Price Adjustment	11,200.00
60.400.308	NAS1-3589-23	Final Contract Price Adjustment	10,952.00
		VEHICLES SUBTOTAL	$ 56,906.00
MISSION MODS (01-04)			
60.400.199	NAS1-3899-38-4	Final Contract Price Adjustment	$ 384.00
		MISSION MODS SUBTOTAL	$ 384.00
		HARDWARE SUBTOTAL	$ 57,290.00
-02 SUPPORTING ACTIVITIES			
FIELD SERVICES (02-01)			
WALLOPS STATION			
60.400.199	NAS1-3615-6	Final Contract Price Adjustment	$ 113.00
60.400.199	NAS1-3899-22-1	Final Contract Price Adjustment	49.00
		WALLOPS STATION SUBTOTAL	$ 162.00
PRODUCTION SUPPORT (02-02)			
60.400.199	NAS1-3899-16-1	Final Contract Price Adjustment	$ 70.00
60.400.420	NAS1-3899-17-6	Final Contract Price Adjustment	164.00
60.400.199	NAS1-3899-34-4	Final Contract Price Adjustment	188.00
60.400.420	NAS1-3899-41-4	Final Contract Price Adjustment	741.00
		PRODUCTION SUPPORT SUBTOTAL	$ 1,163.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 1,325.00
		PHASE IV SUBTOTAL	$ 58,615.00
PHASE V			
-02 SUPPORTING ACTIVITIES			
SAN MARCO			
66.000.209	NAS1-10000-30-J	San Marco Support	$ 57,056.00
		SAN MARCO SUBTOTAL	$ 57,056.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 57,056.00
		PHASE V SUBTOTAL	$ 57,056.00
PHASE VI SUBTOTAL			$3,211,876.82
PHASE VII SUBTOTAL			$5,466,793.44
		FY 1973 TOTAL	$8,794,341.26
		-01 TOTAL	$5,485,235.57
		-02 TOTAL	$3,255,972.58
		-03 TOTAL	$53,133.11

TABLE XCIII - NASA-492 PROGRAM - DELTA MOTORS (RAS 117)

P.R. NO.	CONTRACT	ITEM	TOTAL
		FY 1964	
20.200.466	L-2570-14	X-248 Motor (441)	$ 10,690.00
20.200.706	NAS1-3664-1	Overrun	10,851.00
20.200.476	NAS1-3664	Completion of 2 X-258 Motors	32,349.00
20.200.423	NAS1-3698-8	Telemetry Transmitters	310.00
60.400.007	NAS1-3698(c2)	Alinement Check	800.00
60.400.431	NAS1-3698(c27)	X-258 Mods. for AFOUI	5,000.00
20.200.330	NAS1-3698	10 X-258 Motors	300,000.00
20.200.472	NAS1-3698	X-258 Motors (Add. Funds)	70,000.00
		TOTAL OBLIGATED	$430,000.00
		FY 1964 DELTA MOTORS TOTAL	$430,000.00
		FY 1965	
ADB100	L-15974	Test Support Equipment	$ 610.27
60.400.218	L-57579	Igniter Shipment	95.00
20.200.706	NAS1-3664-1	Overrun	894.00
60.400.114	NAS1-3664-3(c2)	Mod. Delta X-258 Motor	2,500.00
60.400.127	NAS1-3664-3(c2)	Dissection X-258 RH-63	1,000.00
20.200.476	NAS1-3664	Completion of 2 X-258 Motors	1,694.00
60.400.007	NAS1-3698-1(c5)	X-258 Nozzle Alinement Check	5.00
20.200.641	NAS1-3698-3	5 X-258C Motors	77,904.13
60.400.114	NAS1-3698-5(c6)	Mod. Delta X-258 Motor	2,504.00
60.400.167	NAS1-3698-6(c7)	Mod. X-258 RH-101-103 Chambers	12,018.00
60.400.167	NAS1-3698-6(c8)	Mod. X-258 RH-76	4,500.00
60.400.167	NAS1-3698-6(c9)	X-258 EP-87 Swatches	9,813.00
60.400.182	NAS1-3698-6(c9)	X-258 EP-87 Swatches	2,500.00
60.400.363	NAS1-3698-6(c9)	X-258 EP-87 Swatches	2,360.00
60.400.201	NAS1-3698-6(c10)	X-258 Wedge Clamps	200.00
60.400.363	NAS1-3698-6(c10)	X-258 Wedge Clamps	146.00
60.400.167	NAS1-3698-6(c11)	Change 5 X-258 from E2 to C4	3,669.00
60.400.202	NAS1-3698-6(c11)	Change 5 X-258 from E2 to C4	20,000.00
60.400.363	NAS1-3698-6	X-258 Wedge Rings	87,250.00
60.400.328	NAS1-3698-7	X-258 Rocket Motors Overrun	184,611.60
60.400.398	NAS1-3698-9	Conversion X-258C1 to X-258C2	260.00
60.400.267	NAS1-3698-9(c18)	X-258E to C Motors	44,794.00
60.400.402	NAS1-3698-10	X-258 Nozzle Motion Study	17,575.00
60.400.289	NAS1-3698-10(21)	Hardware, Reinstall. X-258 Igniters	3,818.00
60.400.301	NAS1-3698-9(c20)	Mod. X-258 RH-86	2,400.00
60.400.235	NAS1-3698-10(c21)	Salvage of Unreinforced Igniters	3,859.00
60.400.322	NAS1-3698-10(c21)	X-258 Igniters	27,037.00
60.400.345	NAS1-3698(c23)	Changing X258 Nozzle RH-85	2,500.00

TABLE XCIII Concluded - NASA-492 PROGRAM - DELTA MOTORS (RAS 117)

FY 1965

P.R. NO.	CONTRACT	ITEM	TOTAL
60.400.384	NAS1-3698-11(c25)	Ign. Train. Mod. X-258 Ign.	$ 5,000.00
60.400.394	NAS1-3698-11(c25)	Mod. X-258 Igniter	20,000.00
60.400.394	NAS1-3698-11(c26)	X-258 Ignition Train. Mod.	5,000.00
	NAS1-3698	Hercules Shipping	2,241.00
		TOTAL OBLIGATED	$548,758.00
		FY 1965 DELTA MOTORS TOTAL	$548,758.00

FY 1966

60.400.456	NAS1-3664-4	Overrun, X-258	$ 885.00
45.110.051	NAS1-3664(209)	DOD Plant Services (DCASO)	32.00
20.200.641	NAS1-3698-3	5 X-258C Motors	68,211.87
60.400.328	NAS1-3698-8	X-258 Rocket Motors	64,767.41
60.400.423	NAS1-3698-8	Overrun, X-258	18,823.00
01.030.020	NAS1-3698(171)	DOD Plant Services (DCASO)	17.22
60.400.554	NAS1-3698-11(c25)	X-258 Rocket Motor Mfg.	4,500.00
60.400.394	NAS1-3698-11(c26)	Ign. Train. Mod., X-258	4,997.00
60.400.581	NAS1-3698-11(c32)	Mod. X-258 Shipping Container	708.00
45.110.051	NAS1-3698(211)	DOD Plant Services (DCASO)	3,186.00
60.400.405	NAS1-3698(c25)	Mod. Igniter Baskets	50,000.00
20.200.555	NAS1-3698	X-258 Motors	253,713.00
	NAS1-3698	Hercules Shipping	17,798.10
	NAS1-4795-8	Hercules Shipping	518.40
		TOTAL OBLIGATED	$ 488,157.00
		FY 1966 DELTA MOTORS TOTAL	$ 488,157.00
		TOTAL DELTA MOTORS	$1,466,915.00

DOD

NAVY PROGRAM (490-924)

TABLE XCIV - FY 1961 NAVY EXPENDITURES

PRECEDING PAGE BLANK NOT FILMED

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASES II AND III SUBTOTAL			$1,477,021.93
PHASE IV			
PRODUCTION SUPPORT (02-02)			
60.400.557	NAS1-6020-A	Prime Contractor Management	$ 22,434.34
		PRODUCTION SUPPORT SUBTOTAL	$ 22,434.34
		PHASE IV SUBTOTAL	$ 22,434.34
LAUNCH COMPLEX-WTR SUBTOTAL			$ 300,543.73
		FY 1961 TOTAL	$1,800,000.00

FY 1962 NAVY EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASES II AND III SUBTOTAL			$5,633,935.34
PHASE IV			
VEHICLES (01-01)			
LR1-736	NAS1-1295	Scout Vehicles	$1,032,907.40
		VEHICLES SUBTOTAL	$1,032,907.40
MOTORS (01-02)			
Third Stage 20.200.506	NAS1-3493	X-259A3 Motors	$ 30,227.43
		MOTORS SUBTOTAL	$ 30,227.43
SPECIALS			
60.400.664	NAS1-6020-3-B	Payload	$ 116.41
		SPECIALS SUBTOTAL	$ 116.41
DCASO			
01.030.050	NAS1-1330(198)	DOD Plant Services	$ 204.00
01.030.050	NAS1-4664(84)	DOD Plant Services	16,000.00
		DCASO SUBTOTAL	$ 16,204.00
		PHASE IV SUBTOTAL	$1,079,455.24
LAUNCH COMPLEX-WTR SUBTOTAL			$1,186,609.42
		FY 1962 TOTAL	$7,900,000.00

TABLE XCV - MIPR 63-29 FINAL COSTS THROUGH JULY 1, 1972

Scout III (SOLRAD)-Phase II	$ 957,592.12
Scout 116 (AEC)-Phase II	957,592.12
Scout 118-Phase II	957,592.12
Scout 119-Phase II	957,592.12
Scout 120-Phase II	957,592.12
Scout 125-Phase III	1,420,861.76
Scout 140-Phase IV	1,180,361.00
Scout 142-Phase IV	1,180,361.00
Scout 143-Phase IV	1,180,361.00
Scout 146-Phase IV	1,180,361.00
Scout 149-Phase IV	1,180,361.00
Scout 154-Phase IV	1,180,361.00
Scout 156-Phase IV	1,180,361.00
Share of Phase IV Annual Cost	503,458.32
Thiokol Support - S119 (L93419-12)	2,463.00
Jig-Navy Yard (L94200-58)	812.20
Mods (S111) for X-248	7,179.00
Heatshield Mods.	6,719.00
Flyaway Umbilical	4,333.00
Payload Relay Mod.	869.00
34-inch Heatshields less 25.7 heatshields refund	26,610.00
Prorated share of production schedule change	153,686.00
Travel	196,169.96
DCASO	279,266.15
Tooling (Nonrecurring)	400,000.00
WTR Training Cost	4,816.00
S158-S162 Payload Assignment Change	7,690.00
TOTAL	$16,065,420.99
FUNDED DIRECTLY BY NAVY	-8,200,000.00
	$ 7,865,420.99
(MIPR 66-95)	246,872.00
FINAL 63-29 MIPR ESTIMATE	7,618,548.99
NASA SHARE OF FY 1969 VAFB FIELD TEAM	-158,350.00
TOTAL 63-29- COSTS	$ 7,460,198.99

SUMMARY

PHASE II	$ 5,521,569
PHASE III	$ 1,587,198
PHASE IV	$ 9,956,654
SUMMARY TOTAL	$16,065,421

(63-29)

TABLE XCVI - FY 1962 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
NAVY SCOUT PROGRAM			
(63-29-RAS211)			
PHASES II AND III SUBTOTAL			$ 974,814.00
PHASE IV			
MOTORS (01-02)			
Third Stage			
20.200.506	NAS1-3493	X259A3 Motors	$ 856.00
		MOTORS SUBTOTAL	$ 856.00
		PHASE IV SUBTOTAL	$ 856.00
		(63-29) FY 1962 TOTAL	$ 975,670.00

TABLE XCVII - FY 1963 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
NAVY SCOUT PROGRAM			
PHASES II AND III SUBTOTAL			$1,276,262.47
PHASE IV			
VEHICLES (01-01)			
P2Y-079	NAS1-1295-11	Scout Vehicle	$ 761,175.00
20.200.193	NAS1-2650-3(c1)	Guidance System Filter Mod.	4,666.00
20.200.004	NAS1-2650-7	Canceled Completion of Contract	-162,460.00
20.200.004	NAS1-2650-12	Scout Vehicles	-62,409.00
20.200.004	NAS1-2650	Scout Vehicles	1,226,600.00
		VEHICLES SUBTOTAL	$1,767,572.00
MOTORS (01-02)			
First Stage			
20.200.721	L-47781	Algol IIB-23 Radiographic Inspection	$ -337.04
P22-040	NAS1-1330	Underrun	-13,425.25
Third Stage			
20.200.370	NAS1-2650-3(c5)	X-259 Motor Compatibility Change	7,405.00
20.200.249	NAS1-3493	X-259 Q.C.	6,900.00
20.200.253	NAS1-3493	X-259A3 Spare Components	4,900.00
20.200.506	NAS1-3493	X-259A3 Motors	-37.32

(63-29) Continued

TABLE XCVII Continued - FY 1963 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM		OBLIGATION
		NAVY SCOUT PROGRAM Continued		
(63-29 RAS211) Continued				
PHASE IV Continued				
MOTORS (01-02) Continued				
Fourth Stage				
20.200.239	NAS1-3698	X-258 Motors		48,000.00
20.200.239	NAS1-3698	X-258 Termination		-18,548.00
20.200.242	NAS1-3698	X-258B2 Motors for Q.C.		4,200.00
20.200.243	NAS1-3698	X-258 Spare Components		2,100.00
		MOTORS SUBTOTAL		$ 41,157.39
SPARES (01-03)				
20.200.420	NAS1-3420-3(c6)	Spares		$ 46,000.00
		SPARES SUBTOTAL		$ 46,000.00
PRODUCTION SUPPORT (02-02)				
60.400.664	NAS1-6020-3-G	Standardization		$ 6,137.31
60.400.844	NAS1-6020-29(M21)-A	Prime Contractor Management		110.00
60.400.860	NAS1-6020-29(M23)-A	Prime Contractor Management		376.44
60.400.557	NAS1-6020-E	Systems Engineering		34,926.41
60.400.557	NAS1-6020-G	Standardization		194,293.69
60.400.557	NAS1-6020-P	LTV-LRC Field Support		2,814.79
		PRODUCTION SUPPORT SUBTOTAL		$ 238,658.64
SPECIALS				
		Travel FY 1965	$ 3,133.16	
		Travel FY 1966	26,637.37	
		Travel FY 1967	18,188.51	
		Travel FY 1968	15,903.65	
		Travel FY 1969	-636.44	$ 63,226.25
		SPECIALS SUBTOTAL		$ 63,226.25
		PHASE IV SUBTOTAL		$2,156,614.28

(63-29) Continued

TABLE XCVII Concluded - FY 1963 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM Continued	
(63-29 RAS211) Continued			
PHASE V			
VEHICLES (01-01)			
60.400.957	NAS1-1928-15-1	Overrun	$ 733.00
60.400.443	NAS1-5610	Scout Vehicles	18,548.00
		VEHICLES SUBTOTAL	$ 19,281.00
SPARES (01-03)			
60.400.958	NAS1-1970-9	Overrun	$ 288.00
		SPARES SUBTOTAL	$ 288.00
SPECIALS			
60.400.957	NAS1-1928-12-2	Overrun	$ 186.00
60.400.957	NAS1-1928-17-2	Overrun	839.00
60.400.790	NAS1-7256-18-L	Logistics Support Management	11,529.25
		SPECIALS SUBTOTAL	$ 12,554.25
		PHASE V SUBTOTAL	$ 32,123.25
		(63-29) FY 1963 TOTAL	$3,465,000.00

TABLE XCVIII - FY 1964 AIR FORCE EXPENDITURES

NAVY SCOUT PROGRAM

(63-29 RAS211)			
PHASES II AND III SUBTOTAL			$ 460,742.00
PHASE IV			
MOTORS (01-02)			
Second Stage			
60.400.325	NAS1-5034	Castor Motors	$ 500.00

(63-29) Continued

TABLE XCVIII Concluded - FY 1964 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM Continued	
(63-29 RAS211) Continued			
PHASE IV Continued			
MOTORS (01-02) Continued			
Third Stage			
20.200.506	NAS1-3493	X-259A Motors	$ 658.00
Fourth Stage			
20.200.243	NAS1-3698	X-258 Spare Components	2,100.00
		MOTORS SUBTOTAL	$ 3,258.00
		PHASE IV SUBTOTAL	$ 3,258.00
		(63-29) FY 1964 TOTAL	$ 464,000.00

TABLE XCIX - FY 1965 AIR FORCE EXPENDITURES

NAVY SCOUT PROGRAM

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE III SUBTOTAL			$ 245,195.24
PHASE IV			
VEHICLES (01-01)			
20.200.286	NAS1-1295-32(c75)	34-inch Heat Shield, A-14	$ 31,012.00
60.400.186	NAS1-3589-9	Vehicle Recertification Requirement	19,334.00
60.400.234	NAS1-3589-9	Recertification Program	24,742.00
60.400.414	NAS1-3589-20(c47)	Mod. H at Shield A-14	7,000.00
60.400.199	NAS1-4664	Veh. Checkout and Delivery (139-150)	503,126.25
60.400.784	NAS1-6020-17-Ca28-R	Repair and Reassign. Base A, S-137	10,000.00
		VEHICLES SUBTOTAL	$ 595,214.25
MOTORS (01-02)			
First Stage			
P22-040	NAS1-1330	Underrun	$ -750.00
60.400.515	NAS1-4794-3	Shipment of Algol IIB 41 and 44	2,000.00

(63-29) Continued

TABLE XCIX Continued - FY 1965 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM Continued	
(63-29 RAS211) Continued			
PHASE IV Continued			
MOTORS (01-02)			
First Stage			
P22-040	NAS1-1330	Underrun	$ -750.00
60.400.515	NAS1-4794-3	Shipment of Algol IIB 41 and 44	2,000.00
Second Stage			
60.400.325	NAS1-5034	Castor Motors	136,075.00
60.400.121	NAS1-5034-4	Final Contract Cost Adjustment	-3,209.00
Third Stage			
20.200.669	L-35506	Storage of Casting Powder	718.00
60.400.287	NAS1-3493-3	Rubber Boots, X-259 Igniters	426.00
20.200.249	NAS1-3493	X-259 Q.C. Test	6,700.00
20.200.253	NAS1-3493	X-259A3 Spare Components	4,294.00
20.200.506	NAS1-3493	X-259A3 Rocket Motors	-426.00
Fourth Stage			
60.400.406	NAS1-3698-7(c12)	X-258 EP-87 Swatches	2,422.00
		MOTORS SUBTOTAL	$ 148,250.00
SHIPPING			
VEHICLES			
	NAS1-6020	LTV Shipping	$ 3,444.29
MOTORS			
First Stage			
	NAS1-4794-9	Aerojet Shipping	144.00
Second Stage			
	NAS1-5883	LTV Shipping	2,614.40
Fourth Stage			
	NAS1-3493, NAS1-3698	Hercules Shipping	33.93
	NAS1-3698	Hercules Shipping	2,520.80
	NAS1-4664	LTV Shipping	2,254.43
	NAS1-5883	LTV Shipping	2,684.80
SPARES			
	NAS1-6020	LTV Shipping	1,372.23
		SHIPPING SUBTOTAL	$ 15,068.88

(63-29) Continued

TABLE XCIX Continued - FY 1965 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
NAVY SCOUT PROGRAM Continued			
(63-29 RAS211) Continued			
PHASE IV Continued			
PRODUCTION SUPPORT (02-02)			
60.400.664	NAS1-6020-3-B	Payload Coordination	$ 10,986.38
60.400.664	NAS1-6020-3-E	Systems Engineering	60,000.00
60.400.781	NAS1-6020-15-Ca22-R	Repair Base A, S-158C	1,329.00
60.400.557	NAS1-6020-E	Systems Engineering	21,000.00
60.400.557	NAS1-6020-F	Reliability	108,342.07
		PRODUCTION SUPPORT SUBTOTAL	$ 201,657.45
DCASO			
45.110.018	NAS1-3493	DOD Plant Services	$ 8,434.28
01.030.022	NAS1-4664(126,127)	DOD Plant Services	25,134.40
01.030.050	NAS1-4664(84,85)	DOD Plant Services	1,528.00
01.030.050	NAS1-5034(223)	DOD Plant Services	682.00
01.030.050	NAS1-5883(453)	DOD Plant Services	2,928.00
		DCASO SUBTOTAL	$ 38,706.68
SPECIALS			
60.400.854	NAS1-6020-30-Ca51-R	Algol Nozzle Investigation	$ 3,182.00
		SPECIALS SUBTOTAL	$ 3,182.00
		PHASE IV SUBTOTAL	$1,002,079.26
PHASE V			
SHIPPING			
MOTORS			
Second Stage	NAS1-5610	LTV Shipping	$ 795.00
Third Stage	NAS1-5610	LTV Shipping	795.00

(63-29) Continued

TABLE XCIX Concluded - FY 1965 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
(63-29 RAS211) Continued			
PHASE V Continued			
SHIPPING Continued			
MOTORS Continued			
Fourth Stage			
	NAS1-5610	LTV Shipping	$ 2,614.40
SPARES			
	NAS1-6020	LTV Shipping	1,157.10
		SHIPPING SUBTOTAL	$ 5,361.50
PRODUCTION SUPPORT (02-02)			
60.400.790	NAS1-7256-18-L	Logistics Support Management	$ 750.00
		PRODUCTION SUPPORT SUBTOTAL	$ 750.00
		PHASE V SUBTOTAL	$ 6,111.50
PHASE VI PLANNED			$ 1,913.00
		(63-29) FY 1965 TOTAL	$1,255,299.00

TABLE C - FY 1966 AIR FORCE EXPENDITURES

NAVY SCOUT PROGRAM

(63-29 RAS211)			
PHASE IV			
SHIPPING			
MOTORS (01-02)			
First Stage			
	NAS1-6020	LTV Shipping	$ 24.74
		SHIPPING SUBTOTAL	$ 24.74

(63-29) Continued

TABLC C Concluded - FY 1966 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM Continued	
(63-29 RAS211) Continued			
PHASE IV Continued			
PRODUCTION SUPPORT (02-02)			
60.400.664	NAS1-6020-3-B	Payload Coordination	$ 8,213.40
60.400.650	NAS1-6020-3-F	Reliability	27,065.28
60.400.557	NAS1-6020-A	Prime Contractor Management	155,489.59
60.400.557	NAS1-6020-B	Payload Coordination	28,033.81
60.400.557	NAS1-6020-C	Preflight Planning	11,644.00
60.400.557	NAS1-6020-D	Data Analysis	241,453.51
60.400.557	NAS1-6020-E	Systems Engineering	229,269.87
60.400.557	NAS1-6020-F	Reliability	168,890.17
60.400.557	NAS1-6020-P	LTV-LRC Support	182,274.21
		PRODUCTION SUPPORT SUBTOTAL	$1,052,333.84
DCASO			
01.030.050	NAS1-1295(283,284)	DOD Plant Services	$ 320.00
		DCASO SUBTOTAL	$ 320.00
		PHASE IV SUBTOTAL	$1,052,678.58
PHASE V			
PRODUCTION SUPPORT (02-02)			
60.400.557	NAS1-6020-C	Preflight Planning	$ 33,686.00
		PRODUCTION SUPPORT SUBTOTAL	$ 33,686.00
DCASO			
01.030.050	NAS1-5610(563)	DOD Plant Services	$ 16.00
		DCASO SUBTOTAL	$ 16.00
		PHASE V SUBTOTAL	$ 33,702.00
		(63-29) FY 1966 TOTAL	$1,086,380.58

(66-95)

AIR FORCE EXPENDITURES

TABLE CI - FY 1967 AIR FORCE EXPENDITURES

NAVY SCOUT PROGRAM

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
(66-95 RAS219)			
PHASE II SUBTOTAL			$ -631.00
PHASE IV			
-01 HARDWARE			
VEHICLES (01-01)			
60.400.199	NAS1-4664-5	Supporting Services for Ph. IV	$ 70,259.58
60.400.506	NAS1-4664-8	Services & Materials, Add. Veh.	85,071.87
60.400.199	NAS1-4664	Veh. Checkout and Del. (S-139-150)	103,234.65
60.400.649	NAS1-6020-8-Ca10-L	Optical Alinement Assy's S155-162)	2,000.00
60.400.784	NAS1-6020-17-Ca28-R	Repair and Reassign S-157 Base-A Sec.	-10,000.00
		VEHICLES SUBTOTAL	$ 250,566.10
MOTORS (01-02)			
First Stage			
P22-040	NAS1-1330	Underrun	$ -14,895.03
60.400.122	NAS1-3833-4	Algol Overrun	294,847.00
60.400.773	NAS1-6020-19-Ca49-S	Rework Algol IIB-55 Igniter Sleeve	-103.00
Second Stage			
60.400.443	NAS1-5610	7 Castor II Rocket Motors	70,947.00
60.400.773	NAS1-6020-19-Ca45-S	9 Batch Test Motors, Castor II	-140.00
60.400.773	NAS1-6020-19-Ca57-S	X-ray of Castor Nozzle	-58.00
Third Stage			
60.400.443	NAS1-5610	1 Antares X-259 Motor	62,454.00
60.400.773	NAS1-6020-19-Ca36-S	Prep. X-259 Chamber for Shipping	-43.00
60.400.773	NAS1-6020-19-Ca56-S	Fab. Aft Insul. Mold for X-259 Motors	-690.00
60.400.686	NAS1-5883	X-258 Motors	144,300.00
60.400.731	NAS1-5883-7(c13)	Burst Test on New FW4S Motor Case	-7,800.00
60.400.779	NAS1-5883-7(c17)	Nozzle Inserts, FW-4S Motors	-2,400.00
60.400.710	NAS1-5883-6(c9C)	Mods. FW-4S Nozzles	10,000.00
60.400.773	NAS1-6020-19-Ca37-S	X-258 Aging Process	-432.00
60.400.773	NAS1-6020-19-Ca37-S	Dir. Margin-of-Safety Prog., X258	3,200.00
60.400.773	NAS1-6020-19-Ca41-S	Fourth Stage Initiators	-477.00

(66-95) Continued

TABLE CI Continued - FY 1967 AIR FORCE EXPENDITURES

NAVY SCOUT PROGRAM Continued

(66-95 RAS219) Continued

PHASE IV Continued

MOTORS (01-02) Continued

Fourth Stage

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
60.400.773	NAS1-6020-19-Ca47-S	Instrumentation for FW-4S Motor	$ -398.00
60.400.773	NAS1-6020-19-Ca54-S	Removal X-258 Nozzle	2,202.00
60.400.833	NAS1-6020-35-Ca69-S	Prep. X-258 Motor for Shipment	3,585.00
		MOTORS SUBTOTAL	$ 564,098.97

SPARES (01-03)

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
60.400.653	L-84997	Spares Repairs	$ 65,369.00
60.400.649	NAS1-6020-8-Ca2-L	Spares	1,500.00
60.400.649	NAS1-6020-8-Ca3-L	Spares	6,000.00
60.400.649	NAS1-6020-8-Ca4-L	Spares	22,000.00
60.400.649	NAS1-6020-8-Ca6-L	Spares	24,000.00
60.400.649	NAS1-6020-8-Ca7-L	Spares	7,000.00
60.400.649	NAS1-6020-8-Ca8-L	Spares	12,000.00
60.400.557	NAS1-6020-11-Ca9-L	Spares	136.00
60.400.649	NAS1-6020-11-Ca11-L	Spares	2,337.00
60.400.649	NAS1-6020-11-Ca12-L	Spares	18,648.00
60.400.649	NAS1-6020-11-Ca13-L	Spares	5,213.00
60.400.729	NAS1-6020-11-Ca13-L	Spares	-1,225.00
60.400.729	NAS1-6020-11-Ca13-1-L	Spares	-6,000.00
60.400.649	NAS1-6020-11-Ca14-L	Spares	5,600.00
60.400.729	NAS1-6020-11-Ca14-L	Spares	214.00
60.400.649	NAS1-6020-14-Ca17-L	Spares	690.00
		SPARES SUBTOTAL	$ 163,482.00

MISSION MODS (01-04)

ITEM		OBLIGATIONS
Travel FY67	$ 2,236.62	
Travel FY68	10,707.09	
		$ 12,943.71
MISSION MODS SUBTOTAL		$ 12,943.71

(66-95) Continued

TABLE CI Continued - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE IV Continued			
SHIPPING			
VEHICLES			
	NAS1-6020	LTV Shipping	$ 1,829.87
MOTORS			
First Stage	NAS1-4794-9	Aerojet Shipping	1,845.60
Second Stage	NAS1-5883	LTV Shipping	1,037.64
Third Stage	NAS1-5883	LTV Shipping	1,869.72
	NAS1-6020	LTV Shipping	380.50
Fourth Stage	NAS1-5883	LTV Shipping	20.03
	NAS1-6020	LTV Shipping	7.20
SPARES			
	NAS1-6020	LTV Shipping	1,436.19
		SHIPPING SUBTOTAL	$ 8,426.75
		HARDWARE SUBTOTAL	$ 999,517.53
-02 SUPPORTING ACTIVITIES			
DCASO			
01.030.050	NAS1-3833(212,213)	DOD Plant Services	$ 250.80
01.030.020	NAS1-4664(127)	DOD Plant Services	28,090.99
01.030.050	NAS1-5034(223,224)	DOD Plant Services	246.00
01.030.050	NAS1-6020(580)	DOD Plant Services	49,112.00
		DCASO SUBTOTAL	$ 77,699.79

(66-95) Continued

TABLE CI Continued - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE IV Continued			
-02 **SUPPORTING ACTIVITIES Continued**			
FIELD SERVICES (02-01)			
WESTERN TEST RANGE			
60.400.557	NAS1-6020-2-N	AFWTR Field Effort Transfer to A.F.	$ -529,141.00
60.400.557	NAS1-6020-N	AFWTR Field Team	533,957.00
		WESTERN TEST RANGE SUBTOTAL	$ 4,816.00
PRODUCTION SUPPORT (02-02)			
60.400.199	NAS1-4664	Supporting Services for Phase IV	$2,807,159.81
60.400.557	NAS1-6020-2-A	Prime Contractor Management	-3,824.00
60.400.557	NAS1-6020-3-A	Prime Contractor Management	551.27
60.400.664	NAS1-6020-3-A	Prime Contractor Management	61,039.50
60.400.650	NAS1-6020-3-C	Preflight Planning	50,947.00
60.400.557	NAS1-6020-3-D	Data Analysis	7,233.00
60.400.650	NAS1-6020-3-D	Data Analysis	65,777.49
60.400.557	NAS1-6020-3-E	Systems Engineering	375,000.00
60.400.650	NAS1-6020-3-E	Systems Engineering	360,715.44
60.400.650	NAS1-6020-3-F	Reliability	22,237.48
60.400.557	NAS1-6020-5-A	Prime Contractor Management	403,393.71
60.400.702	NAS1-6020-6(c1)-G	Revision of Standard Procedures	10,000.00
60.400.704	NAS1-6020-6(c2)-A	Prime Contractor Management	15,230.00
60.400.650	NAS1-6020-9-E	Systems Engineering	40,642.28
60.400.776	NAS1-6020-15(c5)-A	Prime Contractor Management	7,690.00
60.400.789	NAS1-6020-15(c32)-R	Replacement of Scout Veh. Comps.	35,000.00
60.400.773	NAS1-6020-19-Ca48-S	Extens. Shelf Life of Initiator, Castor	736.00
60.400.557	NAS1-6020-27-E	Incentive Penalty for Veh. S-160C	-375,000.00
60.400.557	NAS1-6020-33-A	Termination	-48,028.00
60.400.557	NAS1-6020-33-D	Termination	-150,178.00
60.400.557	NAS1-6020-33-E	Termination	-22,629.00
60.400.557	NAS1-6020-33-F	Termination	-5,774.00
60.400.557	NAS1-6020-33-G	Termination	-22,025.00
60.400.557	NAS1-6020-A	Prime Contractor Management	31,673.42
60.400.557	NAS1-6020-E	Systems Engineering	48,000.00

(66-95) Continued

TABLE CI Continued - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
(66-95 RAS219) Continued			
PHASE IV Continued			
-02 SUPPORTING ACTIVITIES (Continued)			
PRODUCTION SUPPORT (02-02) Continued			
60.400.557	NAS1-6020-F	Reliability	$ 4,118.78
60.400.650	NAS1-6020-F	Reliability	1,655.22
60.400.557	NAS1-6020-G	Standardization	22,025.00
		PRODUCTION SUPPORT SUBTOTAL	$3,743,367.40
LOGISTICS (02-03)			
60.400.729	NAS1-6020-20-Ca42-L	Logistics Support	$ 68,500.00
60.400.729	NAS1-6020-20-Ca44-L	Logistics Support	10,000.00
60.400.729	NAS1-6020-20-Ca46-L	Logistics Support	1,900.00
60.400.729	NAS1-6020-20-Ca50-L	Logistics Support	5,000.00
		LOGISTICS SUPPORT SUBTOTAL	$ 85,400.00
		SUPPORTING ACTIVITIES SUBTOTAL	$3,911,283.19
-03 PRODUCT IMPROVEMENT			
ALGOL NOZZLE AND FAILURE INVESTIGATION			
60.400.866	NAS1-6020-30-Ca51-R	S-160 Algol Nozzle Investigation	$ 13,697.00
60.900.108	NAS1-6020-39-E	Incentive Refund, S-160C	250,000.00
		ALGOL NOZZLE AND FAILURE INVESTIGATION SUBTOTAL	$ 263,697.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ 263,697.00
		PHASE IV SUBTOTAL	$5,174,497.72
PHASE V			
-01 HARDWARE			
VEHICLES (01-01)			
ADB100	L-15974	Stock Issues	$ 14.76
60.400.621	NAS1-5610-2	Scout Vehicles	511,867.67

(66-95) Continued

TABLE CI Continued - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE V Continued			
-01 HARDWARE Continued			
VEHICLES (01-01) Continued			
60.400.677	NAS1-5610-3	Autodestruct System	$ 4,131.83
60.400.724	NAS1-5610-7(c10)	Scout Vehicles	6,946.00
60.400.795	NAS1-5610-9(c15)	Temperature Meas., S-170 & Sub.	1,000.00
60.400.557	NAS1-6020-3-K	Vehicle Checkout	165,497.12
60.400.650	NAS1-6020-3-K	Vehicle Checkout	297,010.81
60.400.664	NAS1-6020-3-K	Vehicle Mod. Checkout	3,767.00
60.400.557	NAS1-6020-5-H	Support to Vehicle Checkout	5,016.00
60.400.557	NAS1-6020-5-K	Vehicle Checkout	52,482.00
60.400.649	NAS1-6020-8-Ca7-L	Spin Motors	23,000.00
60.400.649	NAS1-6020-11-Ca9-L	Explosive Bolts	29,000.00
60.400.738	NAS1-6020-13-K	Mods., Body Bending Filters,S-160-162	17,775.07
60.400.787	NAS1-6020-13-K	Mods., Body Bending Filters,S160-162	6,800.00
60.400.557	NAS1-6020-33-K	Termination of 5 Vehicles	-543,332.00
60.400.557	NAS1-6020-33-T	Termination of 5 Vehicles	-3,443.00
60.900.039	NAS1-6935-44	Fourth-Stage S-Band Instrumentation	98,687.00
60.400.790	NAS1-7256-18-H	Support to Vehicle Processing	28,800.00
60.400.790	NAS1-7256-18-T	Vehicle Processing Hardware	47,200.00
60.400.790	NAS1-7256-18-V	Tooling	267,000.34
		VEHICLES SUBTOTAL	$1,019,220.60
MOTORS (01-02)			
First Stage			
60.400.659	NAS1-5610-4(c2)	Algol Initiators	$ 6,500.00
60.400.679	NAS1-5610-9(c4)	Protctv. Pkg'g, Algol IIB Ret. Assy.	1,000.00
60.400.443	NAS1-5610	Algol Motors	38,732.00
Second Stage			
60.400.443	NAS1-5610	Castor II Rocket Motors	86,828.00
60.400.443	NAS1-5610	1 Castor Pyrogen Igniter	1,693.00
60.400.686	NAS1-5882-3	Castor II Rocket Motors	257,747.00

(66-95) Continued

TABLE CI Continued - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE V Continued			
-01 HARDWARE Continued			
MOTORS (01-02) Continued			
Third Stage			
60.400.443	NAS1-5610	Antares X-259 Motor	$ 65,212.00
60.400.724	NAS1-5610-7(c10)	Refurb. X-259 Shipping Containers	534.00
60.400.532	NAS1-5883-9	Deletion of X-259 Motor S/N HIB-208	-2,800.00
Fourth Stage			
60.400.813	NAS1-5610-10(c16)	Reconfig. & Install FW-4S Inserts	-5,000.00
60.400.875	NAS1-5610-15(M11)	Leak Tests, FW-4S Motors	-243.00
60.400.686	NAS1-5883-3	X-258 Motors	78,953.00
60.400.757	NAS1-5883-5	5 X-258E5 Motors	247,958.00
60.400.686	NAS1-5883-10	Deletion of 6 X-258 Motors	-10,202.00
60.400.757	NAS1-5883-10	Deletion of 6 X-258 Motors	-182,673.00
66.000.082	NAS1-5883-12	Termination Costs, Deletion 6 X-258's	54,620.74
		MOTORS SUBTOTAL	$ 638,859.74
SPARES (01-03)			
60.400.729	NAS1-6020-20-Ca40-L	Spares	$ -425.00
60.400.729	NAS1-6020-20-Ca42-L	Logistics Support	-3,475.00
60.400.729	NAS1-6020-20-Ca43-L	Spares	6,771.00
60.400.729	NAS1-6020-20-Ca44-L	Logistics Support	-4,188.00
60.400.729	NAS1-6020-20-Ca46-L	Spares	$ -133.00
60.400.729	NAS1-6020-20-Ca50-L	Spares	-100.00
60.400.773	NAS1-6020-20-Ca52-L	Proc. Miscellaneous Spares	-94.00
60.400.729	NAS1-6020-20-Ca53-L	Proc. Miscellaneous Spares	-1,013.00
60.400.729	NAS1-6020-20-Ca55-L	Replace Phil. React. Control Sys.	-4,251.00
60.400.729	NAS1-6020-20-Ca58-L	Spares Procurement	-93.00
60.400.729	NAS1-6020-20-Ca59-L	Spares Procurement	-495.00
60.400.729	NAS1-6020-28-Ca60-L	Spares Procurement	-325.00
60.400.729	NAS1-6020-28-Ca62-L	Spares Procurement	5,302.00
60.400.729	NAS1-6020-28-Ca63-L	Proc. Spares, Mark II Launcher	3,025.00
60.400.729	NAS1-6020-28-Ca64-L	Spares Procurement	4,470.00

(66-95) Continued

TABLE CI Continued - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM		OBLIGATION
		NAVY SCOUT PROGRAM Continued		
(66-95 RAS219) Continued				
PHASE V Continued				
-01 HARDWARE Continued				
SPARES (01-03) Continued				
60.400.729	NAS1-6020-28-Ca65-L	Spares Procurement		$ 3,820.00
60.400.729	NAS1-6020-28-Ca66-L	Procurement of Spares		8,375.00
60.400.729	NAS1-6020-28-Ca67-L	Crating 3 Excess Rocket Motor Cases		165.00
60.400.729	NAS1-6020-28-Ca70-L	GFE for Instr. Resp. Invest. at AVCO		1,749.00
60.400.729	NAS1-6020-36-Ca68-L	Procurement of Spares		25,000.00
60.400.729	NAS1-6020-36-Ca72-L	Compnts. for Vinson Fueling Unit (VAFB)		7,189.00
60.400.729	NAS1-6020-36-Ca75-L	Spares		600.00
		SPARES SUBTOTAL		$ 51,874.00
MISSION MODS (01-04)				
		Travel FY69	$55,361.62	
		Travel FY70	270.49	
		Travel FY71	1,486.75	
				$ 57,118.86
		MISSION MODS SUBTOTAL		$ 57,118.86
SHIPPING				
VEHICLES				
	NAS1-5610	LTV Shipping		$ 899.20
	NAS1-6020	LTV Shipping		18.15
MOTORS				
First Stage				
	NAS1-5610	LTV Shipping		3,793.20
Second Stage				
	NAS1-5610	LTV Shipping		4,414.40

(66-95) Continued

TABLE C1 Continued - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE V Continued			
-01 HARDWARE Continued			
SHIPPING Continued			
MOTORS Continued			
Third Stage	NAS1-5610	LTV Shipping	$ 5,567.15
Fourth Stage	NAS1-5610	LTV Shipping	540.80
SPARES	NAS1-6020	LTV Shipping	38.39
		SHIPPING SUBTOTAL	$ 15,271.29
		HARDWARE SUBTOTAL	$1,782,344.49
-02 SUPPORTING ACTIVITIES			
DCASO			
01.030.050	NAS1-5610(564)	DOD Plant Services	$ 39,759.50
		DCASO SUBTOTAL	$ 39,759.50
FIELD SERVICES (02-01)			
WESTERN TEST RANGE			
60.400.134	L-52073	FY71 Ops. & Maint. Expends. at WTR	$ 8,911.50
60.900.055	NAS1-7256-21-N	50% VAFB Launch Serv.,7/1/70-11/1/71	75,813.00
60.900.143	NAS1-7256-29-N	Technician at WTR, Sep.-Oct. 1970	3,756.00
		WESTERN TEST RANGE SUBTOTAL	$ 88,480.50

(66-95) Continued

TABLE CI Concluded - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATIONS
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.557	NAS1-6020-33-C	Termination	$ -33,686.00
60.400.557	NAS1-6020-41-E	Underrun	-354,113.00
60.400.557	NAS1-6020-42-E	Termination Sale Material Credit	-142.26
60.400.790	NAS1-7256-5-A	Program Management	124,000.00
60.400.790	NAS1-7256-5-B	Payload Coordination	20,000.00
60.400.790	NAS1-7256-5-C	Preflight Planning	34,000.00
60.400.790	NAS1-7256-5-D	Data Reduction and Analysis	11,571.46
60.400.790	NAS1-7256-18-D	Data Reduction and Analysis	217,189.00
60.400.790	NAS1-7256-18-E	Systems Engineering	3,467.26
60.400.790	NAS1-7256-18-F	Reliability Program	117,058.00
60.400.790	NAS1-7256-18-W	Certification Program	30,000.00
		PRODUCTION SUPPORT SUBTOTAL	$ 169,344.46
SHIPPING			
	NAS1-7256	LTV Shipping	$ 23.93
		SHIPPING SUBTOTAL	$ 23.93
		SUPPORTING ACTIVITIES SUBTOTAL	$ 297,608.39
-03 PRODUCT IMPROVEMENT			
ROLL AND YAW			
60.900.009	NAS1-7256-18(M7)-H	Roll and Yaw Compensation, S-176	$ 48,280.00
		ROLL AND YAW SUBTOTAL	$ 48,280.00
		PRODUCT IMPROVEMENT SUBTOTAL	$ 48,280.00
		PHASE V SUBTOTAL	$2,128,232.88
PHASE VI PLANNED			$1,031,403.83
PHASE VII PLANNED			$2,886,762.78
		(66-95) FY 1967 TOTAL	$11,220,266.21

(66-95) Continued

TABLE CII - FY 1968 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM	
(66-95 RAS219)			
PHASE IV			
-01 HARDWARE			
MOTORS (01-02)			
First Stage			
60.400.675	NAS1-6020-16-Ca20-S	Preparation Algol IIB for Shipment	$ -426.00
60.400.675	NAS1-6020-16-Ca30-S	Exchange Algol IIB Motor Nozzles	-51.00
60.400.773	NAS1-6020-16-Ca31-S	Replacing Algol II Nozzle on S-157	-165.00
60.400.675	NAS1-6020-16-Ca34-S	Rework Algol IIB, S-160	-357.00
Second Stage			
60.400.675	NAS1-6020-16-Ca39-S	Rework Castor II Motor Tool	-633.00
Third Stage			
60.400.675	NAS1-6020-16-Ca18-S	Reinspection of 5 X-259 Motors	-2,202.00
60.400.675	NAS1-6020-16-Ca35-S	Machining X-259 Nozzles	-1,285.00
Fourth Stage			
60.400.675	NAS1-6020-16-Ca21-S	Qual. Test, X-258E6	-6,089.00
60.400.675	NAS1-6020-16-Ca23-S	Third and Fourth Stg. Init. Dev. Prog.	-1,991.00
		MOTORS SUBTOTAL	$ -13,199.00
		HARDWARE SUBTOTAL	$ -13,199.00
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.675	NAS1-6020-16-Ca38-S	Explosive Bolts, Shelf Life Ext.	$ -12.00
	DCASO	(DOD Share of 497 OSS)	18,000.00
	DCASO	(DOD Share of 490 LRC)	41,313.00
		PRODUCTION SUPPORT SUBTOTAL	$ 59,301.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 59,301.00
		PHASE IV SUBTOTAL	$ 46,102.00

(66-95) Continued

TABLE CII Continued - FY 1968 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE V			
-01 HARDWARE			
MOTORS (01-02)			
First Stage 60.900.102	L-52075	Destruction of 1 Algol Noz.,Squibs	$ 414.46
Fourth Stage 66.000.082	NAS1-5883-12	Termination Costs,Deletion 6 X-258's	91,379.26
		MOTORS SUBTOTAL	$ 91,793.72
SPARES (01-03)			
60.400.729	NAS1-6020-20-Ca58-L	Procurement of Spares	$ 1,250.00
60.400.729	NAS1-6020-20-Ca59-L	Procurement of Spares	2,800.00
60.400.729	NAS1-6020-28-Ca60-L	Procurement of Spares	9,161.00
		SPARES SUBTOTAL	$ 13,211.00
MISSION MODS (01-04)			
66.900.023	NAS1-7256-33-Ca34-S	Prep. Trans. D for 42" Stat. Ld. Tst.	$ 209.00
60.400.931	NAS1-10000-17-R-7	Verification X-258 Igniter Integrity	400.50
60.400.931	NAS1-10000-17-R-16	Verification X-258 Igniter Integrity	1,861.00
60.400.931	NAS1-10000-17-R-27	N-17 Heat Shield Design and Mod.	4,200.00
60.400.931	NAS1-10000-R-7	Verification X-258 Igniter Integrity	645.50
60.400.931	NAS1-10000-R-27	N-17 Heat Shield Design and Mod.	1,236.00
		Travel FY70 $63,244.81	
		Travel FY71 37,425.48	
			100,670.29
		MISSION MODS SUBTOTAL	$ 109,222.29
		HARDWARE SUBTOTAL	$ 214,227.01

(66-95) Continued

TABLE CII Concluded - FY 1968 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM Continued	
(66-95 RAS219) Continued			
PHASE V Continued			
-02 SUPPORTING ACTIVITIES			
FIELD SERVICES (02-01)			
WESTERN TEST RANGE			
66.000.065	L-64709	FY72 Ops. & Maint. Expends., WTR	$ 5,375.00
		WESTERN TEST RANGE SUBTOTAL	$ 5,375.00
PRODUCTION SUPPORT (02-02)			
66.900.054	NAS1-6935-43	3rd,4th,5th-Stg.Mtr.Shelf Life Study	$ 59,637.00
60.400.790	NAS1-7256-18-F	Reliability	75,726.74
60.900.023	NAS1-7256-27-Ca28-S	Castor II Shelf Life Ext. Program	80,000.00
60.400.931	NAS1-10000-17-R-17	Invent. & Tag GFE at WI and VAFB	5,303.83
60.400.931	NAS1-10000-17-R	Special Programs	36.00
60.400.931	NAS1-10000-R	Special Programs	55,802.17
60.900.172	NAS1-10481	Tech. Support by Hercules Inc./ABL	99,996.00
		PRODUCTION SUPPORT SUBTOTAL	$ 376,501.74
		SUPPORTING ACTIVITIES SUBTOTAL	$ 381,876.74
		PHASE V SUBTOTAL	$ 596,103.75
PHASE VI PLANNED			$2,889,803.29
PHASE VII PLANNED			$3,242,335.96
		(66-95) FY 1968 TOTAL	$6,715,032.00

(63-29) Continued

TABLE CIII - FY 1969 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM	
(63-29 RAS211)			
PHASE IV			
MOTORS (01-02)			
Third Stage 20.200.113	L-3920-15	X-259, Correction to Amend. 14	$ 6,500.00
		MOTORS SUBTOTAL	$ 6,500.00
		PHASE IV SUBTOTAL	$ 6,500.00
PHASE V			
PRODUCTION SUPPORT (02-02)			
60.400.790	NAS1-7256-18-G	Standardization & Config. Control	$ 47,531.41
60.400.790	NAS1-7256-18-J	S-163CR Refurbishment	163,000.00
		PRODUCTION SUPPORT SUBTOTAL	$ 210,531.41
		PHASE V SUBTOTAL	$ 210,531.41
		(63-29) FY 1969 TOTAL	$ 217,031.41
DIRECT FIELD SERVICES			
	AF-04(701)-68-C-0072	50-Percent Support at VAFB FY69	$ 158,350.00
		DIRECT FIELD SERVICES SUBTOTAL	$ 158,350.00
		(63-29) TOTAL	$7,461,467.99

TABLE CIV - FY 1970 AIR FORCE EXPENDITURES

		NAVY SCOUT PROGRAM	
(66-95 RAS219)			
PHASE VI PLANNED			$1,020,931.00
		(66-95) FY 1970 TOTAL	$1,020,931.00

(66-95) Continued

TABLE CV - FY 1971 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		NAVY SCOUT PROGRAM	
(66-95 RAS219)			
PHASE V			
-01 HARDWARE			
MISSION MODS (01-04)			
		Travel FY71 $4,345.24	
		Travel FY72 , 7,999.85	
			$ 12,345.09
		MISSION MODS SUBTOTAL	$ 12,345.09
		HARDWARE SUBTOTAL	$ 12,345.09
		PHASE V SUBTOTAL	$ 12,345.09
PHASE VI PLANNED			$ 2,051,127.89
PHASE VII PLANNED			$ -1.31
		(66-95) FY 1971 TOTAL	$ 2,063,471.67
DIRECT FIELD SERVICES (02-01)			
	AF-04(695)-67-C-0038	50-percent Support at VAFB FY67	($210,372.00)
	AF-04(701)-68-C-0072	50-percent Support at VAFB FY68	(164,200.00)
	AF-04(701)-68-C-0252	50-percent Support at VAFB FY70	(134,250.00)
		DIRECT FIELD SERVICES SUBTOTAL	($508,822.00)
		(66-95) TOTAL	$21,019,700.88
PLANNED			$69,503.37

AIR FORCE PROGRAM (490-934)

TABLE CVI - DOD EXPENDITURES

SCOUT		(9)	(15)	(1)	(3)	(10)	NONSCOUT	TOTAL
	GSE	PHASES II & III**	PHASE IV**	PHASE V**	PHASE VI (PLANNED)	PHASE VII (PLANNED)		
59-4-5-6								
1961 & PRIOR							$ 6,718,936	$ 6,718,936
62-6								
1962	$ 634,288	$1,920,277	$ 4,604,901		$ 13,392		89,524	7,262,382
1963	75,798	420,757	378,951		8,590		9,190	893,286
1964		105,686	154,595					260,281
1965		202,721	1,055,371		6,667		10,747	1,275,506
1966			641,428				2,000	643,428
1967			520,612					520,612
1969			267,502					267,502
62-12								
1962							264,395	264,395
62-13								
1962							482,794	482,794
62-14								
1962							832,318	832,318
1963							480,414	480,414
1965							11,615	11,615
63-27								
1963							100,000	100,000
*63-29								
1962		974,814	856					975,670
1963		1,276,263	2,156,614	32,123				3,465,000
1964		460,742	3,258					464,000
1965		245,195	1,002,079	6,112				1,255,299
1966			1,052,679	33,702				1,086,381
1969			6,500	210,531				217,031
63-30								
1963							5,301	5,301
63-32								
1962		15,368					440,930	456,298
1963		1,372,632					115,368	1,488,000
63-44								
1964							67,600	67,600
1966							61,360	61,360
1968							3,150	3,150
64-30								
1964							185,500	185,500
1965							2,900	2,900
1966							34,680	34,680
65-42								
1965	200,000							200,000
1966	200,000							200,000
66-87								
1967							248,000	248,000
*66-95								
1967		-631	5,174,498	2,128,233	1,031,404	$2,886,762		11,220,266
1968			-13,211	594,420	2,891,487	3,242,335		6,715,031
1970					1,020,931			1,020,931
1971				12,345	2,051,128	-1		2,063,472
*68-71								
1969								0
1970								0
TOTAL	$1,110,086	$6,993,824	$17,006,633	$3,017,466	$7,025,512	$6,129,096	$10,166,722	$51,449,339

---

*Navy Program funded by Air Force. Does not include funds for WTR Field Team.
**Final Costs.

PRECEDING PAGE BLANK NOT FILMED

Table CVII shows the support funding received for the Air Force Blue Scout Program. The NASA/DOD organization provided motors, support hardware, and software for the Blue Scout Program. Funding totaling $6,718,936.06 was provided by the Air Force on MIPR's 59-4, 59-5, and 59-6. Additional funds on Scout Program MIPR 62-6 was provided for the Blue Scout Program. This $38,230.37 was authorized for a second-stage motor. Support for other DOD programs was provided by the Scout Project Office. The funding for these was as follows:

MIPR	PROGRAM	TOTAL	DETAILED
62-12	Beanstalk	$264,395.01	Table CVIII
62-13	Beanstalk	482,794.20	Table CVIII
62-14	Blue Scout Jr.	1,324,347.38	Table CIX
63-27	Air Force Support	100,000.00	Table CX
63-30	Air Force Support	5,301.00	Table CX
63-44	SATAR	132,110.00	Table CXI
64-30	B.S.D.	223,080.00	Table CXII
65-42	VAFB Support	400,000.00	Table CXIII
66-87	Air Force Support	248,000.00	Table CXIV
71-F-0921	Navy Support	2,600.00	Table CXV

The Air Force orbital vehicle program was funded on MIPR 62-6. This consisted of eight Scout launch vehicles, one each in Phases II and III (published in LWP 804) and six in Phase IV. MIPR 62-6 was funded at $11,122,996.30. The expenditures are summarized in table CXVI. The detailed expenditures for MIPR 62-6 are listed in tables CXVII through CXXIII. Air Force MIPR 63-32 funded the software and support for the four Scout vehicles purchased by the Air Force from LTV in addition to one Scout launch vehicle (S-132). Table CXXIV summarizes this funding. Details were furnished in LWP 804. Publication LWP 804 also has a reproduction of the NASA/DOD Scout System Organization Agreement. The NASA/DOD Scout Program is continuing in Phases VI and VII.

TABLE CVII - AIR FORCE R & D FUNDING FY60-61 PROGRAM

609A FUND SUMMARY (04-649)-59-4-5-6

Contractors	
Aerojet	$ 817,011.12
Thiokol	659,411.17
ABL	528,800.00
American Pottash	32,639.60
Goodyear Aircraft	2,500.00
LTV	2,334,409.27
Minneapolis-Honeywell	2,304,950.00
Norfolk Navy Yard	9,000.00
Others	30,214.90
TOTAL PROGRAM	$6,718,936.06

690A FUND SUMMARY (04-695)-62-6#1

Thiokol	$38,230.37

TABLE CVIII - BEANSTALK PROGRAM

(FY 1962)

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
(62-12 RAS202)			
20.200.188	L-2570-10	X-248 Increase	$ 9,000.00
P25-013	L-6991	X-248A5	40,500.00
20.200.184	L-6991-4	X-248A5 Overrun	7,500.00
P25-011	L-6992	3 XM-33E7	128,500.00
P26-003	L-6992-3	XM-33 Increase	500.00
P06283	L-6992-5	Underrun	-5,604.99
P25-012	L-6993	3 X-254A1	84,000.00
		(62-12) SUBTOTAL	$264,395.01
(62-13 RAS202)			
P38-019	L-2061-5	Castor Handling Manual	$ 482.00
P-6282	L-2061-8	Castor Reject Fund	5,535.00
P12132	L-2061-9	Castor Reject Fund	16,200.00
P26-001	L-6991-1	9 X-248A5	121,500.00
P26-001	L-6991-2	Cancel 9 X-248A5	-80,800.00
P06283	L-6992-2	6 XM-33E7	270,000.00
P06283	L-6992-5	Underrun	-760.01
P06283	L-6992-6	Underrun	-1,145.79
P26-002	L-6993-1	9 X-254A1	252,000.00
P26-002	L-6993-3	Cancel 9 X-254A1	-102,000.00
60.400.516	NAS1-3493-3	Shipment X-259 Motors	243.00
	NAS1-3698	Shipping 25 Initiators (SATAR)	1,540.00
		(62-13) SUBTOTAL	$482,794.20
		(62-12, 13) FY 1962 TOTAL	$747,189.21
		BEANSTALK (62-12, 13) TOTAL	$747,189.21

TABLE CIX - BLUE SCOUT JR. PROGRAM

(FY 1962)

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
(62-14 RAS205)			
P22-048	L-2061	Castors	$ 396,404.00
P06282	L-2061-8	Castor Reject Fund	5,535.00
P22-047	L-3920	X-259	324,000.00
P06286	L-3920-4	X-259 Increase	4,659.00
P38-002	L-3920-4	X-259 Replacement Reject	9,380.80
P04361	L-3920-9	Squibs	200.00
20.200.107	L-3920-9	X-259 Documentation	3,375.00
P08154	L-15985	Squibs	243.20
P08552	L-15985	Squibs	210.00
20.200.104	L-93985-12-24	X-259 HPC-26 Repair	1,278.00
P22-034	NAS1-1026-4	Alcor	70,000.00
P38-008	NAS1-1026-6	Alcor Chamber	6,854.49
P22-034	NAS1-1026-8	Fee Reduction	-2,500.00
01.030.022	NAS1-1026	DOD Plant Services (DCASO)	21.60
45.110.020	NAS1-1026	DOD Plant Services (DCASO)	32.00
20.200.252	NAS1-3493	X-259A3 Reject Replacements	10,715.00
	NAS1-3698	Hercules Shipping (SATAR)	1,909.65
		(62-14) SUBTOTAL	$ 832,317.74
		(62-14) FY 1962 TOTAL	$ 832,317.74

(FY 1963)

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
(62-14 RAS205)			
P38-019	L-2061-5	Castor Handling Manual	$ 500.00
P12-132	L-2061-9	Castor Reject Fund	16,200.00
P07942	L-3920-4	X-259 Tooling	2,565.00
P27-012	L-3920-2	Jr. Motor Accessories	18,000.00
P38-002	L-3920-4	X-259 Replacement Rejects	14,190.20
P39-004	L-3920-4	X-259 Replacement Rejects	1,286.00
P07940	L-3920-7	X-259 Rubber Cover	856.00
20.200.105	L-3920-9	2 X-259 Burst Tests	6,339.00
20.200.106	L-3920-9	X-259 Shipping Containers	6,429.00
20.200.108	L-3920-9	X-259 Drawings	3,054.00
20.200.109	L-3920-9	ABL Travel X-259	3,000.00
20.200.111	L-3920-9	X-259 HPC-119 Repairs	257.00
20.200.113	L-3920-9	X-259 Overrun	107,649.00
20.200.166	L-3920-10	X-259A3 HPC-115 Static Firing	882.00
20.200.166	L-3920-10	X-259A3 HPC-118 Adapter	450.00
20.200.168	L-3920-10	X-259 Overrun	62,118.00
20.200.112	L-93985-12-2	X-259 Overrun	35,194.00

TABLE CIX Concluded - BLUE SCOUT JR. PROGRAM

(FY 1963) Continued

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
(62-14 RAS205) Continued			
P37-006	L-93985-12-16	X-259 Chambers	$ 1,200.00
P02568	L-93985-12-20	X-259 Test HPC-103	2,250.00
20.200.101	L-93985-12-21	Hydroburst X-259 Chamber	744.00
20.200.102	L-93985-12-22	Kenvil Igniter Evaluation	3,924.00
20.200.103	L-93985-12-23	X-259 Skirt Repair	1,182.00
20.200.162	L-93985-13-19	X-259 HPC-114	1,694.00
20.200.161	L-93985-13-20	X-259 HPC-103	1,667.00
20.200.163	L-93985-13-25	X-259A3 HPC-111 Static Firing	343.00
20.200.164	L-93985-13-26	X-259 HPC-112 Nozzle Repair	765.00
20.200.165	L-93985-13-27	X-259A3 Acc., Update HPC-109	1,434.00
P25-019	NAS1-1026	Alcor	40,000.00
01.030.022	NAS1-1026	DOD Plant Services	68.00
P22-034	NAS1-1026-4	Alcor	110,000.00
P38-007	NAS1-1026-4	Alcor Cases	5,401.00
20.200.325	NAS1-1026-6	Alcor Overrun	27,415.00
20.200.549	NAS1-1026-7	Cost Incr. Repair and Inspect. Alcor	630.00
20.200.270	NAS1-1026-7(c2)	Alcor Inspection	1,000.00
P22-034	NAS1-1026-8	Fee Reduction	-72.00
P38-006	NAS1-1821	NOTS Motor Case	1,500.00
P38-025	NAS1-1821	NOTS Motor Case	300.00
		(62-14) SUBTOTAL	$ 480,414.20
		(62-14) FY 1963 TOTAL	$ 480,414.20

(FY 1965)

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
(62-14 RAS205)			
P22-034	NAS1-1026	Contract Finalization	$ -8,486.56
45.110.018	NAS1-1026	DOD Plant Services (DCASO)	102.00
20.200.325	NAS1-1026-6	Alcor Overrun	20,000.00
		(62-14) SUBTOTAL	$ 11,615.44
		(62-14) FY 1965 TOTAL	$ 11,615.44
		BLUE SCOUT JR. (62-14) TOTAL	$1,324,347.38

TABLE CX - AIR FORCE SUPPORT

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		(FY 1963)	
(63-27 RAS213)			
20.200.191	NAS1-1330-8	Algol IIA	$100,000.00
		(63-27) FY 1963 TOTAL	$100,000.00
(63-30 RAS213)			
P11725	L-6992-4	XM-33 Nozzle	$ 5,301.00
		(63-30) FY 1963 TOTAL	$ 5,301.00

TABLE CXI - SATAR PROGRAM

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		(FY 1964)	
(63-44 RAS214)			
20.200.117	NAS1-3698	X-258 Expended Chamber	$ 600.00
20.200.240	NAS1-3698	2 X-258 Motors	48,000.00
20.200.242	NAS1-3698	X-258B2 Motors for Q. C.	2,800.00
20.200.243	NAS1-3698	X-258 Spare Components	8,400.00
20.200.555	NAS1-3698	X-258 Motors	7,800.00
		(63-44) FY 1964 TOTAL	$ 67,600.00
		(FY 1966)	
(63-44 RAS214)			
60.400.416	NAS1-3420-16(c30)	Holex Explosive Bolt	$ 100.00
60.400.059	NAS1-3698-5	X-258 Nozzle Closure Mod.	500.00
60.400.423	NAS1-3698-8	X-258 Rocket Motors Overrun	53,512.00
60.400.435	NAS1-3698-9	OV-1 Mod.	939.00
01.030.022	NAS1-3698(171)(190)	DOD Plant Services (DCASO)	4,006.10
01.030.050	NAS1-3698(210)	DOD Plant Services (DCASO)	536.00
60.400.547	NAS1-3698(c33)	M/S for X-258 RM	1,029.00
	NAS1-3698	Hercules Shipping	737.90
		(63-44) FY 1966 TOTAL	$ 61,360.00
		(FY 1968)	
(63-44 RAS214)			
60.400.757	NAS1-5883-5	Powder for 2 X-258E5 Motors	$ 3,150.00
		(63-44) FY 1968 TOTAL	$ 3,150.00
		(63-44) TOTAL	$132,110.00

TABLE CXII - B. S. D. PROGRAM

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		(64-30)	
		FY 1964	
(64-30 RAS216)			
20.200.506	NAS1-3493	X-259A3 Motors	$182,200.00
60.400.490	NAS1-3493	X-259 Production Delay	2,343.00
60.400.517	NAS1-3493	X-259 Program Extension	957.00
		(64-30) FY 1964 TOTAL	$185,500.00
		FY 1965	
60.400.059	NAS1-2650	Redesign Nozzle Enclosure	$ 400.00
60.400.197	NAS1-3493	Squibs	2,500.00
		(64-30) FY 1965 TOTAL	$ 2,900.00
		FY 1966	
60.400.206	NAS1-3493-3(c3)	Motor Cork Insulation	$ 1,000.00
60.400.506	NAS1-3493	X-259A3 Rocket Motors	33,680.00
		(64-30) FY 1966 TOTAL	$ 34,680.00
		(64-30) TOTAL	$223,080.00

TABLE CXIII - WESTERN TEST RANGE - DOD SUPPORT

		(65-42)	
		FY 1965	
(65-42 RAS217)			
20.200.691	NAS1-4325	Systems Test Fac. Stand.	$200,000.00
		(65-42) FY 1965 TOTAL	$200,000.00
		FY 1966	
60.400.074	NAS1-4325	Scout GSE	$200,000.00
		(65-42) FY 1966 TOTAL	$200,000.00
		(65-42) TOTAL	$400,000.00

TABLE CXIV - A.F. 66-87 AIR FORCE SUPPORT

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		(FY 1967)	
(66-87 RAS220)			
60.400.532	NAS1-5883	4 X-258 Rocket Motors (LTV)	$248,000.00
		(66-87) FY 1967 TOTAL	$248,000.00
		(66-87) TOTAL	$248,000.00

TABLE CXV - FY 1971 NAVY SUPPORT

PHASE V

SPECIAL AUTHORIZATION

60.900.127	NAS1-7256-33-Ca33-S	Fab. SOLRAD-C Payload Protective Sh.	$ 2,600.00
		VEHICLES SUBTOTAL	$ 2,600.00
		PHASE V SUBTOTAL	$ 2,600.00
		FY 1971 TOTAL	$ 2,600.00

TABLE CXVI - MIPR 62-6 FINAL COSTS

	PHASE	OBLIGATIONS
XM33-E5 Motor without Nozzle	X	$ 38,230.37
Scout S-113	II	957,592.12
Asset Guidance Components	II	13,032.00
X-258 Payload Motor Case	II	500.00
Umbilical Cable (Payload 79)	II	587.00
Change Frequencies S-138	II	2,959.00
Umbilical Cable AO-10	II	493.00
Payload Users Manuals	II	45,709.00
Adhesive for S-113	II	707.50
Production Schedule Change	II	122,946.00
Ground Support Equipment (Includes $11,522.39 Transit Supt.)	II	730,464.48
Motor Storage Facility	III	73,231.08
Scout S-128	III	1,420,861.76
6 Scouts (S-145, 147, 148, 150, 151, 158)	IV	6,436,632.18
Phase IV Supporting Activities	IV	882,531.00
DOD Plant Services	III & IV	114,828.06
6 E-Section Separation Systems	IV	157,715.00
Travel	II,III,IV	123,836.92
Miscellaneous Shipping	IV	139.72
TOTAL		$11,122,996.30

MIPR 62-6 SUMMARY

Phase II - S-113	$ 1,894,131.10
Phase III -S-128	1,572,128.86
Phase IV - S-145, 147, 148, 150, 151,158	7,605,648.97
Non-Scout	38,230.37
TOTAL	$11,122,996.30
San Marco Credit	897.00
	$11,123,893.30

TABLE CXVII - MIPR 62-6 FY 1962 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		609A PROGRAM	
(62-6 LINE 1 RAS208)			$ 38,230.37
		609A PROGRAM SUBTOTAL	$ 38,230.37
		AIR FORCE SCOUT PROGRAM	
PHASES II AND III SUBTOTAL			$1,920,276.87
PHASE IV			
VEHICLES (01-01)			
P2Y-079	NAS1-1295-11	Scout Vehicles	$2,899,968.00
P26-079	NAS1-1295-14(c4)	Algol Improvement	95,462.00
P38-026	NAS1-1295-18	Reliability	201,000.00
20.200.365	NAS1-1295-34(c79)	Section C Tests	150,000.00
20.200.395	NAS1-1295-34(c79)	Environ. Test Program	75,000.00
20.200.525	NAS1-1295-34(c79)	Environ. Test Program	92,566.00
P2Y-079	NAS1-1295-35	S-137 Checkout Eliminated	-3,333.00
20.200.398	NAS1-1295-36(c82)	Colvin Pressure Trans.	45,000.00
20.200.677	NAS1-2650-5(c7)	Add. Funds, Colvin Press. Trans.	13,181.00
20.200.533	NAS1-3589-2(c1)	Relays in S-124, S-128	4,250.00
20.200.573	NAS1-3589-3	Recertification 130 Series	29,000.00
60.400.186	NAS1-3589-9	Vehicle Recertification Requirements	16,000.00
60.400.014	NAS1-3589-13(c16)	Inv. and Test Sup. S-128R Failure	17,000.00
20.200.509	NAS1-3589	Recertification 120 Series	183,500.00
60.400.557	NAS1-6020-J	Vehicle Modification Checkout	18,375.56
		VEHICLES SUBTOTAL	$3,836,969.56
MOTORS (01-02)			
First Stage			
P2Z-068	NAS1-1330-1	Algols	$ 556,825.46
P10485	NAS1-1330-5(c9)	Algol IIA Overrun	7,432.54
60.400.567	NAS1-4794-6	Radiographic Inspect. Algol IIB-39	2,650.00
Second Stage			
P22-045	L-2061	Castor Motors	60,000.00
P12-132	L-2061-12	Castor Reject	-45,541.99
Third Stage			
20.200.168	L-3920-10	X-259 Overrun	75,066.00
20.200.252	NAS1-3493	Reject Replacement (X-259)	11,910.00
20.200.506	NAS1-3493	X-259A3 Motors	2,837.12
60.400.374	NAS1-4795-3	Refurb. X-259A2 Motors	643.00

(62-6) Continued

TABLE CXVII Continued - FY 1962 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE SCOUT PROGRAM Continued	
(62-6 LINE 3 RAS204) Continued			
PHASE IV Continued			
MOTORS (01-02) Continued			
Fourth Stage			
20.200.242	NAS1-3698	X-258B2 Motors for Q.C.	$ 11,200.00
		MOTORS SUBTOTAL	$ 683,022.13
SPARES (01-03)			
60.400.557	NAS1-6020-L	Logistics Support	$ 13,219.00
		SPARES SUBTOTAL	$ 13,219.00
SHIPPING			
VEHICLES			
	NAS1-6020	LTV Shipping	$ 2,736.53
MOTORS			
Third Stage			
	NAS1-5610	LTV Shipping	540.80
	NAS1-5883	LTV Shipping	63.55
	NAS1-6020	LTV Shipping	927.15
Fourth Stage			
	NAS1-3698	Hercules Shipping	75.00
	NAS1-6020	LTV Shipping	178.78
SPARES			
	NAS1-6020	LTV Shipping	45.65
		SHIPPING SUBTOTAL	$ 4,567.46

(62-6) Continued

TABLE CXVII Concluded - FY 1962 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM		OBLIGATION
		AIR FORCE SCOUT PROGRAM Continued		
(6206 LINE 3 RAS204) Continued				
PHASE IV Continued				
PRODUCTION SUPPORT (02-02)				
60.400.557	NAS1-6020-9-G	Standardization		$ 31,896.12
		PRODUCTION SUPPORT SUBTOTAL		$ 31,896.12
SPECIALS				
		Travel FY62	$22,367.00	
		Travel FY63	218.00	
		Travel FY66	-165.00	
		Travel FY67	9,555.88	
		Travel FY68	16.29	
				$ 31,992.17
		SPECIALS SUBTOTAL		$ 31,992.17
DCASO				
01.030.050	NAS1-3420(391)	DOD Plant Services		$ 16.00
45.110.018	NAS1-3589	DOD Plant Services		1,650.94
01.030.050	NAS1-4664(84)	DOD Plant Services		1,328.00
01.030.050	NAS1-5034(223)	DOD Plant Services		240.00
		DCASO SUBTOTAL		$ 3,234.94
		PHASE IV SUBTOTAL		$4,604,901.38
PHASE VI PLANNED				$ 13,392.11
MOTOR STORAGE FACILITY (62-6 LINE 8 RAS207) SUBTOTAL				$ 51,294.00
WTR GROUND SUPPORT EQUIPMENT (62-6 LINE 5 RAS207) SUBTOTAL				$ 634,287.27
		(62-6) FY 1962 TOTAL		$7,262,382.00

(62-6) Continued

TABLE CXVIII - FY 1963 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE SCOUT PROGRAM	
(62-6 LINE 3 RAS204)			
PHASE II SUBTOTAL			$ 324,887.25
PHASE III SUBTOTAL			$ 95,869.32
PHASE IV			
VEHICLES (01-01)			
20.200.629	NAS1-2650-4(c6)	Connector Mods	$ 3,619.00
60.400.186	NAS1-3589-9	Veh. Recert. Requirements	9,000.00
60.400.393	NAS1-3589-18	Overrun	3,348.00
60.400.199	NAS1-4664	Veh. Checkout & Delivery (139-150)	61,366.30
60.400.621	NAS1-5610-2	Scout Vehicle	6,856.92
60.400.860	NAS1-6020-29(M23)-K	Ext. Shelf Life EX-38 Press. Crtrdg.	27.41
		VEHICLES SUBTOTAL	$ 84,217.63
MOTORS (01-02)			
First Stage			
P2Z-068	NAS1-1330-1	Algols	$ 28,552.17
20.200.340	NAS1-1330-7	Algol IIA Stretchout	33,060.00
20.200.227	NAS1-1330-8	Algol IIA Static Motor	34,616.00
20.200.467	NAS1-1330-8	Algol IIA Increase	41,928.00
20.200.550	NAS1-1330-11(c11)	Algol IIA Ign. Mod. Cost Increase	4,362.00
20.200.228	NAS1-1330-12(c12)	Algol IIA Nozzles	20,000.00
P22-040	NAS1-1330	Algols	4.00
Third Stage			
P38-002	L-3920-4	X-259 Replacement Rejects	25,267.00
P39-004	L-3920-4	X-259 Replacement Rejects	2,000.00
20.200.106	L-3920-9	X-259 Shipping Containers	7,143.00
20.200.111	L-3920-9	X-259 HPC-119 Repairs	286.00
20.200.113	L-3920-9	X-259 Overrun	63,075.00
20.200.113	L-3920-14	X-259 Underrun	-66,500.00
20.200.506	NAS1-3493	X-259A3 Motors	9,610.42
60.400.374	NAS1-4795-3	Refurb. X-259A2 Motors	4,425.30
Fourth Stage			
20.200.243	NAS1-3698	X-258 Spare Components	2,337.70
SHIPPING	NAS1-3698	Hercules Shipping	1,172.70
		MOTORS SUBTOTAL	$ 210,166.59

(62-6) Continued

TABLE CXVIII Concluded - FY 1963 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM		OBLIGATION
		AIR FORCE SCOUT PROGRAM Continued		
(62-6 LINE 3 RAS204) Continued				
PHASE IV Continued				
PRODUCTION SUPPORT (02-02)				
60.400.557	NAS1-6020-G	Standardization		$ 55,504.99
		PRODUCTION SUPPORT SUBTOTAL		$ 55,504.99
SPECIALS				
		Travel FY64	$10,000.20	
		Travel FY65	2,876.09	
		Travel FY66	10,536.12	
		Travel FY67	4,452.96	
		Travel FY68	114.17	
		Travel FY69	-90.00	$ 27,889.54
		SPECIALS SUBTOTAL		$ 27,889.54
		PHASE IV SUBTOTAL		$ 378,951.45
PHASE VI PLANNED				$ 8,589.61
MOTOR STORAGE FACILITY SUBTOTAL				$ 9,190.08
WTR GROUND SUPPORT EQUIPMENT SUBTOTAL				$ 75,798.29
		(62-6) FY 1963 TOTAL		$ 893,286.00

(62-6) Continued

TABLE CXIX - FY 1964 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE SCOUT PROGRAM	
(62-6 LINE 3 RAS204)			
20.200.077	NAS1-2165-4(c2)	Spares	$ -13,754.00
PHASE III SUBTOTAL			$ 105,686,20
PHASE IV			
VEHICLES (01-01)			
60.400.186	NAS1-3589-9	Veh. Recert. Requirement	$ 25,000.00
60.400.199	NAS1-4664	Veh. Checkout & Delivery (139-150)	85.00
		VEHICLES SUBTOTAL	$ 25,085.00
MOTORS (01-02)			
Third Stage			
20.200.506	NAS1-3493	X-259A3 Motors	$ 2,258.26
		MOTORS SUBTOTAL	$ 2,258.26
SPARES (01-03)			
20.200.420	NAS1-3420-3(c6)	Spares	$ 83,838.00
		SPARES SUBTOTAL	$ 83,838.00
PRODUCTION SUPPORT (02-02)			
60.400.557	NAS1-6020-G	Standardization	$ 28,682.47
60.400.557	NAS1-6020-D	Data Analysis	977.07
		PRODUCTION SUPPORT SUBTOTAL	$ 29,659.54
SPECIALS			
60.400.854	NAS1-6020-30-Ca51-R	S-160C Algol Noz. Investigation	$ 13,754.00
		SPECIALS SUBTOTAL	$ 13,754.00
		PHASE IV SUBTOTAL	$ 154,594.80
		(62-6) FY 1964 TOTAL	$ 260,281.00

(62-6) Continued

TABLE CXX - FY 1965 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE SCOUT PROGRAM	
(62-6 LINE 3 RAS204)			
PHASE III SUBTOTAL			$ 202,721.49
PHASE IV			
VEHICLES (01-01)			
60.400.393	NAS1-3589-18	Overrun	$ 9,580.00
60.400.404	NAS1-3589-19	Overrun	59,804.00
60.400.199	NAS1-4664	Veh. Checkout & Delivery (139-150)	573,974.62
53.110.275	NAS1-5478	Blast Shields, Magnesium	5,445.75
60.400.621	NAS1-5610-2	Scout Vehicle	6,756.46
		VEHICLES SUBTOTAL	$ 655,560.83
MOTORS (01-02)			
First Stage			
60.400.364	NAS1-1330-15(c15)	Remov. Noz. 206 from Algol IIB-23	$ 851.00
60.400.369	NAS1-1330-15(c16)	Repair Algol IIB 210 Nozzle	4,728.00
P22-040	NAS1-1330	Underrun	-6,756.46
60.400.370	NAS1-4794-4	Storage and Ship. Algol IIB-37-58	8,253.00
Third Stage			
20.200.506	NAS1-3493	X-259A3 Motors	382.00
60.400.518	NAS1-3493-3	Conversion X-259A3's to X-259A6's	33,680.00
60.400.374	NAS1-4795-3	Refurbish X-259A2 Motors	3,331.70
Fourth Stage			
60.400.328	NAS1-3698-8	X-258 Rocket Motors	33,444.00
		MOTORS SUBTOTAL	$ 77,913.24
PRODUCTION SUPPORT (02-02)			
60.400.557	NAS1-6020-C	Preflight Planning	$ 44,336.00
60.400.557	NAS1-6020-E	Systems Engineering	276,560.44
		PRODUCTION SUPPORT SUBTOTAL	$ 320,896.44
SPECIALS			
60.400.334	NAS1-3899-40	5 E-Sec. Sep. Sys. & P/L Adapters	$ 5,308.00
60.400.334	NAS1-3899-40-2	5 E-Sec. Sep. Sys. & P/L Adapters	-5,308.00
		SPECIALS SUBTOTAL	$ 0

(62-6) Continued

TABLE CXX Concluded - FY 1965 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE SCOUT PROGRAM Continued	
(62-6 LINE 3 RAS204) Continued			
PHASE IV Continued			
DCASO			
01.030.022	NAS1-3899(158)	DOD Plant Services	$ 1,000.00
		DCASO SUBTOTAL	$ 1,000.00
		PHASE IV SUBTOTAL	$1,055,370.51
PHASE VI PLANNED			$ 6,667.00
MOTOR STORAGE FACILITY (62-6 LINE 8 RAS207) SUBTOTAL			$ 10,747.00
		(62-6) FY 1965 TOTAL	$1,275,506.00

TABLE CXXI - FY 1966 AIR FORCE EXPENDITURES

(62-6 LINE 3 RAS204)			
PHASE IV			
VEHICLES (01-01)			
60.400.645	NAS1-3589-21	Overrun	$ 82,014.00
60.400.621	NAS1-5610-2	Scout Vehicle	1.00
60.400.557	NAS1-6020-3-J	Vehicle Mod. Checkout	15,026.00
60.400.557	NAS1-6020-J	Veh. Mod Checkout	4,670.53
60.400.557	NAS1-6020-K	Vehicle Checkout	1,985.98
		VEHICLES SUBTOTAL	$ 103,697.51

(62-6) Continued

TABLE CXXI Concluded - FY 1966 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
AIR FORCE SCOUT PROGRAM Continued			
(62-6 LINE 3 RAS204) Continued			
PHASE IV Continued			
MOTORS (01-02)			
Third Stage			
60.400.627	NAS1-4795-9	Rework X-259 Nozzles	$ 5,645.00
60.400.684	NAS1-5883-2(c7)	Qual. 3 X-259 Containers	355.00
60.400.634	NAS1-5883-4(c4,12)	X-259 Tunnel Tab Tooling	7,000.00
Fourth Stage			
	NAS1-3698	Hercules Shipping	7.00
		MOTORS SUBTOTAL	$ 13,007.00
PRODUCTION SUPPORT (02-02)			
60.400.557	NAS1-6020-9-G	Standardization	$ 18,610.78
60.400.557	NAS1-6020-B	Payload	33,540.00
60.400.557	NAS1-6020-D	Data Analysis	115,392.93
60.400.557	NAS1-6020-E	Systems Engineering	4,595.56
60.400.557	NAS1-6020-F	Reliability	166,530.00
		PRODUCTION SUPPORT SUBTOTAL	$ 338,669.27
SPECIALS			
60.400.485	NAS1-5592-1	6 E-Sect. Sep. Sys. - A.F.	$ 157,715.00
		SPECIALS SUBTOTAL	$ 157,715.00
DCASO			
01.030.050	NAS1-2650(540)	DOD Plant Services	$ 200.00
01.030.050	NAS1-3420(391,392)	DOD Plant Services	304.00
01.030.050	NAS1-3493(204,205)	DOD Plant Services	1,475.00
01.030.050	NAS1-3589(98,99)	DOD Plant Services	1,172.00
01.030.050	NAS1-3664(208)	DOD Plant Services	384.00
01.030.050	NAS1-4664(85)	DOD Plant Services	4,636.00
01.030.050	NAS1-5883(453)	DOD Plant Services	17,524.68
45.110.051	NAS1-5883(453)	DOD Plant Services	2,475.32
01.030.050	NAS1-6020(579,580)	DOD Plant Services	112.00
01.030.050	NAS5-61(560)	DOD Plant Services	56.22
		DCASO SUBTOTAL	$ 28,339.22
		PHASE IV SUBTOTAL	$ 641,428.00
MOTOR STORAGE FACILITY SUBTOTAL			$ 2,000.00
		(62-6) FY 1966 TOTAL	$ 643,428.00

(62-6) Continued

TABLE CXXII - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE SCOUT PROGRAM	
(62-6 LINE 3 RAS204)			
PHASE IV			
MOTORS (01-02)			
Third Stage 60.400.634	NAS1-5883-4(c4,12)	X-259 Tunnel Tab Tooling-Canceled	$ -7,000.00
Fourth Stage 60.400.700	NAS1-5883-6(c9)	Redesign & Test FW-4S Motor Noz.	310,536.00
		MOTORS SUBTOTAL	$ 303,536.00
SPARES (01-03)			
60.400.557	NAS1-6020-3-L	Logistics Support	$ 81,847.00
		SPARES SUBTOTAL	$ 81,847.00
SHIPPING			
MOTORS			
First Stage	NAS1-5610	LTV Shipping	$ 348.80
Fourth Stage	NAS1-3698	Hercules Shipping	3,171.75
	NAS1-5883	LTV Shipping	3,367.00
	NAS1-6020	LTV Shipping	15.50
SPARES			
	NAS1-6020	LTV Shipping	86.50
MISSION MODS			
	NAS1-6020	LTV Shipping	21.72
		SHIPPING SUBTOTAL	$ 7,011.27

(62-6) Continued

TABLE CXXII Concluded - FY 1967 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE SCOUT PROGRAM Continued	
(62-6 LINE 3 RAS204) Continued			
PHASE IV Continued			
PRODUCTION SUPPORT (02-02)			
60.400.557	NAS1-6020-3-F	Reliability	$ 64,765.00
60.400.557	NAS1-6020-9-G	Standardization	14,360.64
		PRODUCTION SUPPORT SUBTOTAL	$ 79,125.64
SPECIALS			
	L-61717	LRC Packing & Handling Charges	$ 118.00
		Travel FY67 $14,085.80	
		Travel FY68 9,811.41	
			23,897.21
		SPECIALS SUBTOTAL	$ 24,015.21
DCASO			
45.110.051	NAS1-2650(540)	DOD Plant Services	$ 488.00
01.030.050	NAS1-3420(391)	DOD Plant Services	112.00
01.030.050	NAS1-4664(85)	DOD Plant Services	17,060.00
01.030.050	NAS1-5034(223)	DOD Plant Services	1,792.00
45.110.051	NAS1-5883(453)	DOD Plant Services	5,624.88
		DCASO SUBTOTAL	$ 25,076.88
		PHASE IV SUBTOTAL	$ 520,612.00
		(62-6) FY 1967 TOTAL	$ 520,612.00

(62-6) Continued

TABLE CXXIII - FY 1969 AIR FORCE EXPENDITURES

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
		AIR FORCE PROGRAM	
(62-6 LINE 3 RAS204)			
PHASE IV			
VEHICLES (01-01)			
60.400.797	NAS1-4664-22-A	Incentive Fee	$ 214,657.68
		VEHICLES SUBTOTAL	$ 214,657.68
MOTORS (01-02)			
Third Stage 60.400.621	NAS1-5610-2	Antares X-259 Motors	$ 52,844.62
		MOTORS SUBTOTAL	$ 52,844.62
		PHASE IV SUBTOTAL	$ 267,502.30
		(62-6) FY 1969 TOTAL	$ 267,502.30
		(62-6) TOTAL	$11,122,997.30

TABLE CXXIV - MIPR 63-32 - FINAL COSTS

			OBLIGATIONS
1.	Scout 132		$ 862,324
	(a) All costs of Scout 132 Less 1st & 4th stage, pre-flight planning, launch services, and postflight reports	$800,699	
	(b) 4 each Payload Adapters 4 each Umbilicals 4 each Ignition Harness Mods	41,625	
	(c) Scout 132 Travel Costs	20,000	
	(d) Production Schedule Change (Prorated)		15,368
2.	Nonrecoverable Cancellation Costs (3 vehicles)		480,308
3.	X-258 Fourth-stage Motor		30,000
4.	X-259 Motors (4 each) Used on Nonscout Program		266,298
5.	Spare Hardware, Repairs, Services for 4 Air Force Scout - A.F. Direct Procurement, AF-04(695)-20		240,000
6.	Engineering Support for AF-04(695)-20 Vehicles		50,000
TOTAL			$1,944,298

SECTION V - CONTRACTUAL DATA

Table CXXV shows the quantity of vehicles funded, contracted, and launched. It illustrates the quantity of vehicles for each fiscal year that was added to the LTV contracts and which user funded these contracts. The data presented is for the vehicles that were originally manufactured, placed into bonded storage, and at a later date removed for processing for launch (checkout and delivery). Details prior to FY 1966 are recorded in LWP-804.

The Scout contracts include the following phases of the Scout Program:

1. Vehicle Procurement
2. Motor Procurement
3. Systems Management
4. Spares
5. Launch Sites
6. Research and Development
7. Launch Services

Each of these was contracted for each phase of the Scout Program. Table CXXVI lists the major contracts, specifies the phase they cover, and designates the type of contract and the contractor. It also lists the planned follow-on contracts. The contracts with asterisk are detailed in subsequent pages. LWP-804 lists 134 contracts through FY 1965 which detail the Scout Program through Phase III. An additional 51 contracts were added through FY71 and are listed in table CXXVII.

The contracts that cover vehicles 138 through 177 are listed in table CXXVIII for the vehicle hardware and motors, vehicle processing (certified), and launch services for each vehicle.

Table CXXVIX continues listing the contracts covering vehicles 138 through 177 and includes the data on the payload and software as well as the launch year. The software includes Payload Coordination, Preflight Planning, Data Reduction, and Systems Engineering.

Tables CXXX through CLXI include the contract details of the major contracts from FY 1965 through FY 1971. Included are funding scope changes, overrun, incentive, and all CCN and modification information.

Tables CXL, CL, and CLXI itemize the prorated costs for contracts NAS1-5610, NAS1-6020, and NAS1-7256, respectively, as related to each specific Scout vehicle. Contract NAS1-4664 (table CXXXI) also prorates the cost of this contract but itemizes the user costs only and these can be amortize by the straight line method for each user's vehicles. The NASA costs are for vehicles 138, 139, 141, 144, 152, 153, 155, 159, 160, and 161; the Navy for vehicles 140, 142, 143, 146, 149, 154, 156, 157, and 162; and the Air Force for vehicles 145, 147, 148, 150, 151, and 158. Therefore each NASA vehicle is one-tenth of the NASA costs, each Navy vehicle is one-ninth of the Navy costs, and each Air Force vehicle is one-sixth of the Air Force costs.

TABLE CXXV - SCOUT VEHICLES FUNDED (Fiscal Year)

	FY 1965 & PRIOR	1966	1967	1968	1969	1970	1971	TOTAL
DEVELOPMENT	9							9
NASA	20	4	3	4	2	3	1	37
NAVY (for AEC)*	1							1
(Direct)	6							6
(via A.F.)	6	1	8	6			2	23
AIR FORCE	8	1						9
AEC	1							1
INTERNATIONAL	—	—	—	—	—	1	—	1
TOTAL	51**	6	11	10	2	4	3	87

SCOUT VEHICLES CONTRACTED (Fiscal Year)

	FY 1965 & PRIOR	1966	1967	1968	1969	1970	1971	TOTAL
HARDWARE	58		15	15				88
CHECKOUT AND DELIVERY (123, 144, 170 & 178 twice)	35	15	18	(-4)	13	(-1)	14	90

SCOUT VEHICLES LAUNCHED (Fiscal Year)

	FY 1965 & PRIOR	1966	1967	1968	1969	1970	1971	TOTAL
NASA	22	4	3	5	3	1	5	43
ESRO						1		1
AEC	2*							2
DOD	8	6	6	2			1	23
NON-LRC PROCURED	4	—	—	—	—	—	—	4
TOTAL	36	10	9	7	3	2	6	73
VEHICLES UNDER CONTRACT	131	16	22	30	27	25	19	

---

*(116) Navy transferred to AEC.

**SEV also authorized but not funded (development vehicles used).

TABLE CXXVI - NASA-LRC - SCOUT CONTRACTS

			CONTRACTOR	TYPE
1. **VEHICLE PROCUREMENT**				
Phase I	NAS1-249 & NAS1-900		LTV	FFP & CPFF
Phase II	NAS1-1295		LTV	CPFF
Phase II & IV	NAS1-1295 & NAS1-3589		LTV	CPFF
Phase IV	NAS1-2650		LTV	FPI
Phase V	NAS1-5610		LTV	FFP
Phase VI	NAS1-7199		LTV	FFP
Phase VII	NAS1-11000		LTV	FFP
2. **MOTOR PROCUREMENT**				
Phase I	NAS5-53	First Stage (Algol I)	Aerojet	CPFF
	L55931	Second Stage (Castor I)	Thiokol	CPFF
	S-1010G	Third Stage (X-254)	ABL	CPFF
	S-100G	Fourth Stage (X-248)	ABL	CPFF
Phase II & III	NAS1-1330	First Stage (Algol I & II)	Aerojet	CPFF
Phase II	L93419	Second Stage (Castor I)	Thiokol	CPFF
Phase II	L93985	Third & Fourth Stages (X-248) (and X-259)	ABL	CPFF
Phase III	L2061	Second Stage (Castor I)	Thiokol	CPFF
	L03829	Third Stage (X-259)	ABL	CPFF
	NAS1-3664	Fourth Stage (X-258)	ABL	CPFF
Phase IV	NAS1-3822	First Stage (Algol II)	Aerojet	FFP
	NAS1-5034	Second Stage (Castor II)	Thiokol	FFP
	NAS1-3493	Third Stage (X-259)	Hercules	CPFF
	NAS1-3698	Fourth Stage (X-258)	Hercules	FFP
	NAS1-5883	Second, Third, & Fourth Stages (Castor, X-258, X-259, and FW4S)	LTV	FFP
Phase V	NAS1-5610	All Motors	LTV	FFP
Phase VI	NAS1-7199	Four Stages (Algol II, Castor II, X-259, FW4S)	LTV	FFP
	NAS1-6935-40	Algol IIB Nozzles	LTV	FP
	*NAS1-9258	First Stage (Algol III)	LTV	FFP
Phase VII	NAS1-11400	Castor IIA, Antares II, and Altair IIIA	LTV	FFP
	NAS1-13100	Algol III	LTV	FP
3. **SYSTEMS MANAGEMENT**				
Phase III	NAS1-3657		LTV	CPFF
Phase IV	NAS1-4664		LTV	CPIF
Phase IV & V	NAS1-6020		LTV	FPI
Phase V	NAS1-7256		LTV	FPIA
Phase V & VI	NAS1-10000		LTV	FPIA
Phase VI & VII	NAS1-12500		LTV	FPIA

---

*Balance of Motors will be used in Phase VII.

TABLE CXXVI Continued - NASA-LRC - SCOUT CONTRACTS

			CONTRACTOR	TYPE
4. SPARES				
FY 1963	NAS1-1970		LTV	CPFF
FY 1964	NAS1-3420		LTV	CPFF
FY 1965-6	NAS1-4664		LTV	FFP
FY 1967-8	NAS1-6020		LTV	FFP
FY 1969-70	NAS1-7256		LTV	FP
FY 1971-73	NAS1-10000		LTV	FP
FY 1973-76	NAS1-12500		LTV	FP
5. LAUNCH SITES				
East Coast	NAS1-2455		LTV	CPFF
West Coast	NAS1-1481		LTV	CPFF
Africa	NAS1-4899, NAS1-10000-J, NAS1-12500-J		LTV (Italy)	FP,CPFF
6. RESEARCH AND DEVELOPMENT				
	NAS1-249	Original Scout Development	LTV	FFP
	NAS1-1330	First Stage Motor (Algol II)	Aerojet	CPFF
	L-15993	Second Stage Motor (Castor II)	Thiokol	CPFF
	S-1010G	Third Stage (X-254)	Hercules	CPFF
	NORD 16640	Third & Fourth Stages (X-259 and X-258)	Hercules	CPFF
FY 62-63	NAS1-1928	Product Improvement	LTV	CPFF
FY 64-65	NAS1-3899	Product Improvement	LTV	CPFF
Phase III	NAS1-4794	Algol Studies	Aerojet	FFP
	NAS1-4793	Castor Studies	Thiokol	FFP
	NAS1-4795	X-258 & X-259 Studies	Hercules	FFP
FY 64-65	NAS1-5106	Studies - TOLIP	Lockheed	FFP
FY 66-67	NAS1-6692	Product Improvement	LTV	CPIF
FY 68-70	NAS1-6868	Fifth Stage	LTV	CPIF
	NAS1-6935	Product Improvement	LTV	CPFF, FPI,FP,CPFF
	NAS1-6935-5	Roll Yaw	LTV	FFP
	NAS1-6935-10-13	S-Band	LTV	CPFF
	NAS1-6935-34	Jet Vane Studies	LTV	FFP
	NAS1-6935-41	Larger Heat Shield	LTV	CPIF
	NAS1-6935-44	Fourth Stage S-Band	LTV	CPIF
	NAS1-6969	Studies - Error Analysis	TRW	FFP
	NAS1-7102	Fifth Stage Motor (BE-3)	Hercules	FFP
	NAS1-8541	Studies - Instrument Response	AVCO	CPFF
NAS1-8994	Studies - N.D.T.T.		GE	CPFF
	NAS1-9204	Studies - SPEAR	Lockheed	FFP
	NAS1-9258	Algol III - First Stage	LTV	FFP

TABLE CXXVI Concluded - NASA-LRC - SCOUT CONTRACTS

6. RESEARCH AND DEVELOPMENT Continued

			CONTRACTOR	TYPE
Phase V & VI	NAS1-10000-R	Small Product Improvements	LTV	CPFF
Phase VI	NAS1-10481	X-258 Studies	Hercules/B	CPFF
Phase VI	NAS1-10482	Castor Studies	Thiokol	CPFF
Phase VI	NAS1-10483	X-259 Studies	Hercules/B	CPFF
Phase VI	NAS1-10484	Algol III and FW4S Studies	UTC	CPFF
Phase VI	NAS1-10485	Algol II Studies	AGC	CPFF
FY71-72	NAS1-10500	Small Product Improvements	LTV	CPFF, CPIF,FPI,FP
Phase VII	NAS1-10504	Improved Guidance Study	Martin Marietta	FP
Phase VI & VII	NAS1-12500-R	Small Product Improvements	LTV	CPFF

7. LAUNCH SERVICES

Phase I	NAS1-900	LTV	CPFF
Phase II	NAS1-1295	LTV	CPFF
Phase III	NAS1-2189 thru February 1, 1964	LTV	CPFF
Phase III	NAS1-3615 thru October 1, 1965	LTV	CPFF
Phase IV	NAS1-4664 (7-1-66 thru 11-1-66)	LTV	CPIF
Phase IV & V	NAS1-6020 (11-1-66 thru 11-1-68)	LTV	FPI
Phase V	NAS1-7256 (11-1-68 thru 11-1-70)	LTV	FPIA
Phase V & VI	NAS1-10000 (11-1-70 thru 11-1-73)	LTV	FPIA
Phase VI & VII	NAS1-12500 (11-1-73 thru 11-1-76)	LTV	FPIA

TABLE CXXVII - SUMMARY OF SCOUT CONTRACTS (1965-1971)

*Mar 1965	NAS1-4793	Thiokol - Castor II Load Tests	$ 26,600
*Mar 1965	NAS1-4795	Hercules - Sustaining Engineering	474,272
*Apr 1965	NAS1-5034	Thiokol - Second-Stage Motors (140-153)	1,357,403
*May 1965	NAS1-4794	Aerojet - Services - Algol	90,813
*Jul 1965	NAS1-4664	LTV - Systems Management (7-1-65/11-1-66)	11,071,367
*Dec 1965	NAS1-5592	LTV - R & D/Product Improvement through 1966	1,289,994
Jan 1966	L-61691	BuWeps - Logistics Service and Repairs	100,000
Mar 1966	NAS1-6048	LeTourneau - Fourth-Stage Cradles	8,907
May 1966	L-44472	NASA-600 Switching System	38,012
May 1966	NAS1-6444	U.S. Rubber Company - Tooling	22,999
*Jun 1966	NAS1-5880	LTV - San Marco Engineering Sup.(Africa)	688,835
*Jun 1966	NAS1-5883	LTV - Scout Rocket Motors	3,691,275
*Aug 1966	NAS1-5610	LTV - (163-177) Phase V Vehicles	12,343,833
Sep 1966	L-84,995	USNPP - Casting Powder, X-259	26,160
Sep 1966	NAS1-6378	LTV - Maintenance of Tooling and Equip.	0
Oct 1966	NAS1-6748	LTV - Scout Vehicle Storage Study-Cocooning	61,263
*Nov 1966	NAS1-6020	LTV - Systems Management (11-1-66/11-1-68)	13,489,722
Dec 1966	L-84994	USNAD - Scout Rocket Motor Storage	12,500
Jan 1967	AF04(695)67-C-0038	AFWTR Field Team FY67	420,744
*Jan 1967	NAS1-6935	LTV - R & D Product Improvement	5,431,764
*Jan 1967	NAS1-6969	TRW - Error Analysis Study of Scout Veh.	199,870
Apr 1967	NAS1-7314	Hercules - X-258 Retainer Ring Moldings	31,597
*May 1967	NAS1-6868	LTV - Velocity Package	1,181,519
*May 1967	NAS1-7102	Hercules - BE-3 Motor Development	528,525
Jul 1967	L-84,999	U.S. Nav. Weapons Center,X-259 Rkt. Mtr. Tsts.	37,500
Jan 1968	AF04(701)-68-C-0072	AFWTR Field Team FY68	328,400
Apr 1968	NAS1-7199	LTV - Phase VI (178-192) Vehicles	13,168,748
Aug 1968	NAS1-8541	AVCO - Instrument Response	127,768
*Dec 1968	NAS1-7256	LTV - Systems Management (11-1-68/11-1-70)	12,694,653
Jan 1969	AF-04(701)-68-C-0252	AFWTR Field Team FY69	316,700
Mar 1969	NAS1-9273	Thiokol - Castor Shipping Containers	39,000
Jun 1969	NAS1-8994	GE - Eval. Nondestructive Test Techs.	219,630
Jun 1969	NAS1-9258	LTV - Dev. and Phase VII Algol III Motors	4,440,733
Jun 1969	NAS1-9204	Lockheed - Trajectory Reconstruction	150,000
Jun 1969	NAS1-9203	Pullman - S/M Motor Storage Containers	20,043
Jan 1970	AF-04(701)-69-C-0392	AFWTR Field Team FY 1970	268,500
Aug 1970	L-52073(F04701-70-C-0232	FY71 Ops. & Maint. Exp.-WTR	17,823
Nov 1970	NAS1-10000	LTV - Systems Management (11-1-70/11-1-73)	25,899,359
Dec 1970	NAS1-10481	HI/ABL - Tech. Support X-258 Motors	174,996
Dec 1970	NAS1-10483	HI/Bacchus - Tech. Support X-259 Motors	222,848
Jan 1971	NAS1-10482	TCC - Tech. Support Castor Motors	98,574
Jan 1971	NAS1-10504	MMC - Improved Guid. Hardware Study	65,805
Feb 1971	NAS1-10484	UTC-Tech. Sup. Algol IIC Nozz., Algol III, & FW-4S Motors	529,061
Feb 1971	NAS1-10650	AI - Modular Reflectoscopes	11,330
Mar 1971	NAS1-10485	AGC - Tech. Support Algol IIB Motors	100,585
Mar 1971	NAS1-10500	LTV - Tech. Support Scout Programs	623,682
May 1971	NAS1-10763	MMC - Payload Sensor Contamination Study	33,448
May 1971	NAS1-10805	GE - Nozz. Mat'l Thermophys. Charac. Study	99,103
May 1971	NAS1-10848	LTV-Small,Versatile Launch Veh.Decade Rqmt.	231,035
Jun 1971	NAS1-10900	LTV - Tech. Sup. Serv.Flt. Projects and Ground Simulation Facilities	63,000
Nov.1971	L-71225	USNFEC-Wallops Island Butler Buildings	19,000

Note: Does not include NASW-contracts by OSS direct. All contracts prior to 1965 are listed in Final Report on Phases I, II, and III.
*Itemized.

TABLE CXXVIII - SUMMARY OF SCOUT HARDWARE PROCUREMENT

Vehicle	Payload	Launch Year	Vehicle-Contracts		Services	Motor Contract - Stages			
			Production	Certified		First	Second	Third	Fourth
138R	PA	65	NAS1-1295	NAS1-3589-3	NAS1-4664	NAS1-3833	AF	L3920	NAS1-3698-3
139R	PA-1	65	NAS1-1295	NAS1-4664	AT-DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-3698-3
140C	NAVY	65	NAS1-2650	NAS1-4664	DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-3698
141C	OAST	66	NAS1-2650	NAS1-4664	NAS1-4664	NAS1-3833	L2061	NAS1-3493	NAS1-3698
142C	NAVY	66	NAS1-2650	NAS1-4664	DOD	NAS1-3833	L2061	NAS1-3493	NAS1-3698
143C	NAVY	66	NAS1-2650	NAS1-4664	DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-3698
144CR	OAST	71	NAS1-2650	NAS1-4664/ NAS1-7256	NAS1-10000	NAS1-7199	NAS1-7199	NAS1-7199	NAS1-5610
145C	AF	66	NAS1-2650	NAS1-4664	AT-DOD	NAS1-3833	NAS1-5034	NAS1-3493	AF04(695)-588
146C	NAVY	66	NAS1-2650	NAS1-4664	DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-3698
147C	AF	66	NAS1-2650	NAS1-4664	NAS1-4664	NAS1-3833	NAS1-5034	NAS1-3493	AF04(695)-588
148C	AF	66	NAS1-2650	NAS1-4664	DOD	NAS1-3833	NAS1-5034	NAS1-3493	AF04(695)-588
149C	NAVY	66	NAS1-2650	NAS1-4664	DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-3698
150C	AF	66	NAS1-2650	NAS1-4664	AT-DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-5883
151C	AF	67	NAS1-2650	NAS1-4664	DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-5883
152C	PA-I	67	NAS1-2650	NAS1-4664-8	DOD	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-5883
153C	PA-I	67	NAS1-2650	NAS1-4664-8	ITALIAN	NAS1-3833	NAS1-5034	NAS1-3493	NAS1-5883
154C	NAVY	67	NAS1-2650	NAS1-4664-8	DOD	NAS1-3833	NAS1-5883	NAS1-3493	NAS1-3698
155C	PA-I	67	NAS1-2650	NAS1-6020	AT-DOD	NAS1-3833	NAS1-5883	NAS1-5883	NAS1-5883
156C	NAVY	67	NAS1-2650	NAS1-6020	DOD	NAS1-3833	NAS1-5883	NAS1-5883	NAS1-5883

Preceding data in Phases I, II, and III.

TABLE CXXVIII Concluded - SUMMARY OF SCOUT HARDWARE PROCUREMENT

Vehicle	Payload	Launch Year	Vehicle-Contracts		Services	Motor Contract - Stages			
			Production	Certified		First	Second	Third	Fourth
157C	NAVY	67	NAS1-2650	NAS1-6020	DOD	NAS1-3833	NAS1-5883	NAS1-5610	NAS1-3698
158C	AF	67	NAS1-2650	NAS1-6020	DOD	NAS1-3833	NAS1-5883	NAS1-5610	NAS1-5883
159C	OAST	68	NAS1-2650	NAS1-6020	NAS1-6020	NAS1-3833	NAS1-5883	NAS1-5883	NAS1-5883
160C	PA	67	NAS1-2650	NAS1-6020	NAS1-6020	NAS1-5610	NAS1-5883	NAS1-5883	NAS1-5883
161C	PA-I	68	NAS1-2650	NAS1-6020	NAS1-6020	NAS1-5610	NAS1-5883	NAS1-5883	NAS1-5883
162C	NAVY	68	NAS1-2650	NAS1-6020	DOD	NAS1-3833	NAS1-5610	NAS1-5610	NAS1-5883-3
163CR	PA	71	NAS1-5610	NAS1-6020/ NAS1-10000	NAS1-10000	NAS1-5610	NAS1-5610	NAS1-7199	NAS1-5610
164C	OAST	68	NAS1-5610	NAS1-6020	NAS1-6020	NAS1-5610	NAS1-5610	NAS1-5883	None
165C	PA	68	NAS1-5610	NAS1-6020	NAS1-6020	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
166C	PA-I	71	NAS1-5610	NAS1-7256	NAS1-10000	NAS1-5610	NAS1-5610	NAS1-7199	NAS1-5610
167C	PA-I	68	NAS1-5610	NAS1-6020	NAS1-6020	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
168C	OAST	68	NAS1-5610	NAS1-6020	NAS1-6020	NAS1-5610	NAS1-5883	NAS1-5883	NAS1-5610
169C	PA-I	69	NAS1-5610	NAS1-6020	NAS1-6020/ NAS1-7256	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
170CR	PA	72	NAS1-5610	NAS1-7256 NAS1-10000	NAS1-10000	NAS1-9258	NAS1-7199	NAS1-7199	NAS1-5610
171C	OAST	70	NAS1-5610	NAS1-7256	NAS1-7256	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
172C	ESRO	69	NAS1-5610	NAS1-7256	NAS1-7256	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
173C	PA-I	71	NAS1-5610	NAS1-7256	NAS1-10000	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
174C	OAST	70	NAS1-5610	NAS1-7256	NAS1-7256	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
175C	PA	70	NAS1-5610	NAS1-7256	NAS1-10000	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5610
176C	NAVY	70	NAS1-5610	NAS1-7256	DOD/ NAS1-7256	NAS1-5610	NAS1-5610	NAS1-5610	NAS1-5883
177C	PA	71	NAS1-5610	NAS1-7256	NAS1-10000	NAS1-7199	NAS1-5610	NAS1-5610	NAS1-5610

TABLE CXXIX - SUMMARY OF VEHICLE PROCUREMENT

Vehicle	Payload	Launch Year	Payload Coordination			Preflight Planning	Data Reduction Analysis	Systems Engineering	
			General*	Prelim.Traj.	Special Studies			Production	Certified
138R	SOLRAD-B	65	3657	3657	-	3657	4664	1295	3657
139R	French-A	65	3657 - 4664	3657	-	4664	4664	1295	4664
140C	Navy-5	65	3657 - 4664	3657	4664	4664	4664	3589	4664
141C	Reentry-E	66	4664	4664	4664	4664	4664	3589	4664
142C	Navy-6	66	4664	4664	-	4664	4664	3589	4664
143C	Navy-7	66	4664	-	-	4664	4664	3589	4664
144CR	PAET-A	71	10000 - 7256	6020 - 7256	10000 - 7256	10000-4664	10000	3589	4664
145C	OV3-1	66	4664	4664	4664	4664	4664	3589	4664
146C	Navy-8	66	3657	4664	-	4664	4664	3589	4664
147C	OV3-4	66	4664	4664	4664	4664	4664	3589	4664
148C	OV3-3	66	4664	-	-	4664	4664	3589	4664
149C	Navy-9	66	4664	-	-	4664	4664	3589	4664
150C	OV3-2	66	4664	-	-	4664	6020	3589	4664
151C	OV3-5	67	4664	4664	-	4664	6020	3589	4664
152C	ESRO-IIA	67	6020 - 4664	4664	6020 - 4664	6020-4664	6020	3657	4664
153C	San Marco B	67	4664	-	4664	4664	6020	3657	4664
154C	Navy-10	67	4664	-	-	4664	6020	3657	4664
155C	UK-E	67	6020 - 4664	4664	6020 - 4664	6020-4664	6020	3657	6020
156C	Navy-11	67	6020	-	-	6020	6020	3657	6020
157C	Navy-12	67	6020 - 4664	-	-	6020	6020	3657	6020
158C	OV3-6	67	6020 - 4664	-	6020	6020	6020	3657	6020
159C	RAM-C-A	68	6020 - 4664	4664	6020 - 4664	6020	6020	3657	6020
160C	SOLRAD-C	68	6020	6020	6020 - 4664	6020	6020	3657	6020
-	IE-B	Canceled	-	4664	-	-	-	-	-
-	OWL	Canceled	-	-	6020	-	-	-	-

*Includes General Coordination, Interface Drawings, and H/S and Umbilical Designs.
NOTE: All contract numbers are preceded by "NAS1-"

TABLE CXXIX Concluded - SUMMARY OF VEHICLE PROCUREMENT

Vehicle	Payload	Launch Year	Payload Coordination			Preflight Planning	Data Reduction	Systems Engineering	
			General*	Prelim.Traj.	Special Studies			Production	Certified
161C	ESRO-IIB	68	6020	-	6020	6020	6020	3657	6020
162C	Navy-13	68	6020	-	6020	6020	6020	3657	6020
163CR	SSS-A	71	10000 - 7256	7256	6020 - 7256	10000	10000	4664	6020
164C	Reentry-F	68	6020	6020	6020	6020	6020	4664	6020
165C	ADIE-C	68	6020 - 4664	4664 - 6020	4664	6020	6020	4664	6020
166C	GRP-A	71	7256 - 6020	-	6020	10000	10000	4664	7256
167C	ESRO-IA	68	6020 - 4664	4664 - 6020	-	6020	6020 - 7256	4664	6020
168C	RAM-C-B	68	6020	-	-	6020	6020	4664	6020
169C	GRS-A-1	69	7256 - 6020	7256-6020	7256-6020	7256	7256	4664	6020
170CR	SAS-B	72	10000	10000	-	10000	10000	6020	7256
171C	RAM-C-C	70	7256	7256	7256	7256	7256	6020	7256
172C	ESRO-IB	69	7256	7256	-	7256	7256	6020	7256
173C	San Marco-C	71	7256	-	-	10000-7256	10000	6020	7256
174C	OFO-A	70	7256 - 6020	7256	6020-7256	7256	10000	6020	7256
175C	SAS-A	70	7256 - 6020	7256	7256-6020	10000-7256	10000	6020	7256
176C	Navy-14	70	7256 - 6020	-	-	7256	7256	6020	7256
177C	SOLRAD-D	71	7256	-	-	10000-7256	10000	6020	7256

*Includes General Coordination, Interface Drawings, and Heat Shield and Umbilical Designs.
NOTE: All Contract Numbers are preceded by "NAS1-."

TABLE CXXX - SCOUT - NAS1-4664 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract	Scope	Fee	Total
A. Project Management	$263,246	$21,707	$284,953
B. Payload Coordination	301,092	24,840	325,932
C. Preflight Planning	53,173	4,387	57,560
D. Data Reduction & Analysis	612,691	50,547	663,238
E-F. Systems Engineering	1,726,144	142,417	1,868,561
G. Reliability	1,210,112	99,834	1,309,946
H. Stand. & Config. Control	669,971	55,273	725,244
J. Veh. Mod., C/O & Delivery	1,942,365	160,245	2,102,610
K. Logistics Support	305,716	25,222	330,938
L. Wallops Support	898,265	74,107	972,372
M. AFWTR Support	303,362	25,027	328,389
N. LRC Support	263,863	21,769	285,632
	$8,550,000	$705,375	$9,255,375
Mod. 1 (CCN-1) Task J	$6,151	$453	$6,604
Mod. 2 (Statement of Work Change) Task A	0	0	0
Mod. 3 Task L (Reserve for Ret. to Dallas)	114,000	0	114,000
Mod. 4 (GFE Change)	0	0	0
Mod. 5 (Funding Completed)	(2,755,375)	0	0
Mod. 6 (Instrumentation) Task J	83,847	6,917	90,764
Mod. 7 (CCN-2, CCN-2A) Task J	17,945	1,474	19,419
Mod. 8 (Veh. Mod., C/O & Del.) Task J(GAP)	775,025	62,000	837,025
Mod. 9 (Calls 1, 2, 4, 5, 7) Task K	9,593	0	9,593
Mod. 10 (CCN-3) Task J	19,850	1,528	21,378
Mod. 11 Task K	0	0	0
Mod. 12 Task F (Canceled)	12,151	1,600	23,751
Mod. 13 Task J	8,355	689	9,044
Mod. 14 (Calls 3, 6, 9, 10, 11, 13) Task K	107,183	0	107,183
Mod. 15 (CCN-4) Task J	88,116	6,539	94,655

TABLE CXXX Concluded - SCOUT - NAS1-4664 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract	Scope	Fee	Total
Mod. 16 (CCN-5) Task J	$ 5,109	$ 423	$ 5,532
Mod. 17 (Calls 8, 12, 14, 15, 16, 17, 18, 19) Task K	194,809	0	194,809
CCN-6 (Cork)	9,882	815	
Delete Reports	-42,742	-3,419	
Mod, 18			-35,464
Mod. 19 (Calls 20, 21, 22) Task K	13,680	0	13,680
Mod. 20 Task L	-79,086	0	-79,086
Mod. 21 (M-17, Calls 23,24) Task E	18,600	0	18,600
Mod. 22 Incentive	0	367,802	367,802
Mod. 23 Task L	-10,998	0	-10,998
Mod. 24 Overrun	156,256	-23,438	132,818
Workmanship Incentive	125	0	
Employee Benefit Plan	944	0	
Assit Set-Aside	2,280	0	
Overrun	27,790	0	
Mod. 25 (M26) Negotiated Overrun			31,139
		TOTAL CONTRACT	$11,071,367

TABLE CXXXI - FINAL PRORATION OF COSTS
CONTRACT NAS1-4664

TASK	PHASE IV			
	NASA	NAVY	AIR FORCE	TOTAL
A Project Management	$ 94,985	$ 94,984	$ 94,984	$ 284,953
B Payload Coordination	169,485	52,149	104,298	325,932
C Preflight Planning	33,960	17,844	5,756	57,560
D Data Reduction & Analysis	79,589	311,722	271,927	663,238
E-F Systems Engineering	622,853	622,854	622,854	1,868,561
Mod. 12	7,917	7,917	7,917	23,751
Mod. 21	6,200	6,200	6,200	18,600
Mod. 24	44,272	44,273	44,273	132,818
Mods. 25 & 26	10,380	10,379	10,380	31,139
G Reliability	436,649	436,649	436,648	1,309,946
H Standardization & Config. Control	241,748	241,748	241,748	725,244
J Veh. Mod., Checkout & Delivery	672,835	820,018	609,757	2,102,610
Mod. 1	2,113	2,576	1,915	6,604
Mod. 6	29,044	35,398	26,322	90,764
Mod. 7	6,214	7,573	5,632	19,419
Mod. 8	267,848	326,440	242,737	837,025
Mod. 10	6,841	8,337	6,200	21,378
Mod. 13	2,894	3,527	2,623	9,044
Mod. 15	30,290	36,915	27,450	94,655
Mod. 16	1,770	2,158	1,604	5,532
Mod. 18	-11,348	-13,831	-10,285	-35,464
K Logistics Support	110,312	110,313	110,313	330,938
Mod. 9	3,198	3,197	3,198	9,593
Mod. 14	35,728	35,728	35,727	107,183
Mod. 17	64,936	64,936	64,937	194,809
Mod. 19	4,560	4,560	4,560	13,680
L Wallops Island Support	777,898	0	194,474	972,372
M Air Force Western Test Range Support	109,463	109,463	109,463	328,389
N Langley Research Center Support	95,210	95,211	95,211	285,632
Incentive (Mod. 22)	122,601	122,600	122,601	367,802
Field Team Reserve (Mods. 3, 20 & 23)	7,972	7,972	7,972	23,916
A-F 63-32 Reprograming Costs	-127,699	0	127,699	0
TOTAL	$3,960,718	$3,629,810	$3,637,095	$11,227,623

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CXXXII - CONTRACT NAS1-4664 OBLIGATIONS

	NASA			REIMBURSABLE					
FUNDS	490	497	*894	62-6	63-29	63-32	66-95	AEC	TOTAL
FY 1963									
1965									
August				$ 61,997.30		$127,068.00		$ 236,402.00	
November								-236,402.00	
1966									
February				42,075.00	$ 28,147.31				
June				-42,075.00	-28,147.31				
TOTAL FY 1963				$ 61,997.30	$ 0	$127,068.00		$ 0	$ 183,065.30
FY 1964									
1965									
August	$ 121,963.50		$ 53,891.53						
1966									
February				$ 85.00					
TOTAL FY 1964	$ 121,963.50		$ 53,891.53	$ 85.00					$ 175,940.03
FY 1965									
1965									
June		$1,250,000.00							
August	$ 103,234.65	2,969,135.28	$496,108.47	$574,059.62	$503,126.25				
December		200,000.00							
1966									
February				20,456.69					
April	85,071.87								
June				-20,541.69					
1967									
April			150.00						
1972									
September	5,168.00	1,736.00							
December	-188,306.52	-2,807,159.81							
TOTAL FY 1965	$ 5,168.00	$1,613,711.47	$496,258.47	$573,974.62	$503,126.25				$ 3,192,238.81
FY 1966									
1965									
August		$ 3,013.40							
September	$ 7,000.00								
October	15,604.00								
November	5,670.00	236,402.00							
December	1,602,814.68	926,560.32	$ 50,000.00						
1966									
January	-5,670.00								
February	86,170.00								
March	21,219.00								
April	752,253.13		35,700.00						
May	226,320.00		-35,700.00						
June	95,301.00	99,764.00							
July	30,000.00	32,795.00							
August	55,495.00	25,293.00							
November	-89,936.00		2,272.17						
1967									
February	-39,464.00								
April	-15,585.00								
June	-79,086.00								
1972									
September	22,145.00								
December	-70,259.58								
TOTAL FY 1966	$2,709,991.23	$1,318,827.72	$ 52,272.17						$ 4,081,091.12
FY 1967									
1966									
October	$ 4,000.00								
November	-4,000.00		$ 3,259.83						
1967									
April			9,990.00						
June	15,560.00								
1972									
December							$3,065,725.91		
TOTAL FY 1967	$ 15,560.00		$ 13,249.83				$3,065,725.91		$ 3,094,535.74
FY 1968									
1968									
December	$ 3,040.00								
January	367,802.00								
June	-10,998.00								
1972									
December	-214,657.68								
TOTAL FY 1968	$ 145,186.32								$ 145,186.32
FY 1969									
1972									
December				$214,657.68					
TOTAL FY 1969				$214,657.68					$ 214,657.68
FY 1970									
1970									
June	$ 132,818.00								
1972									
September	411.25								
TOTAL FY 1970	$ 133,229.25								$ 133,229.25
FY 1973									
1972									
August	$ 31,139.00								
September	-29,460.25								
TOTAL FY 1973	$ 1,678.75								$ 1,678.75
TOTAL	$3,132,777.05	$2,932,539.19	$615,672.00	$850,714.60	$503,126.25	$127,068.00	$3,065,725.91	$ 0	$11,221,623.00

---

*Includes San Marco Trust Fund.

TABLE CXXXIII - FUNDING OF CONTRACT NAS1-4664

(Includes Modification 25)

PROPORTION	FUNDS-FY	PHASE II	PHASE IV	TOTAL
		$127,068.00	$11,100,555.00	$11,227,623.00
	(490)			
	RAS108-64		(121,963.50)	
	RAS108-66		(951,796.00)	
	RAS125-66		(1,736,050.23)	
	RAS125-67		(15,560.00)	
	RAS125-68		(145,186.32)	
	RAS140-70		(132,818.00)	
	RAS190-65		(5,168.00)	
	RAS190-66		(22,145.00)	
	RAS190-70		(411.25)	
	RAS190-73		(1,678.75)	
	RAS204-63		(61,997.30)	
	RAS204-64		(85.00)	
	RAS204-65		(573,974.62)	
	RAS204-69		(214,657.68)	
	RAS211-65		(503,126.25)	
	RAS212-63	(127,068.00)		
	RAS219-67		(3,065,725.91)	
	(497)			
	RAS123-65		(148,996.00)	
	RAS124-65		(1,262,979.47)	
	RAS126-65		(1,736.00)	
	RAS127-65		(200,000.00)	
	RAS135-66		(1,189,726.72)	
	RAS136-66		(15,693.00)	
	RAS137-66		(22,644.00)	
	RAS138-66		(90,764.00)	
	(894)			
	RAS110-64		(53,891.53)	
	RAS110-65		(496,108.47)	
	RAS110-66		(52,272.17)	
	RAS150-67		(3,259.83)	
	RAS153-65		(150.00)	
	RAS153-67		(9,990.00)	
	TOTAL	$127,068.00	$11,100,555.00	$11,227,623.00

TABLE CXXXIV - SCOUT - NAS1-4793 (CONTRACT HISTORY) THIOKOL CHEMICAL CORPORATION

TASK 1 - Development of an Exterior Insulation for the Castor II Nozzle (5-19-65)

60.400.257	RAS123	$1,680	
60.400.299	RAS123	1,000	
TOTAL			$2,680

TASK 2 - Technical Support of Castor II Nozzle Load Tests to be Conducted by LTV Aerospace Corporation (7-21-65)

60.400.399	RAS123	$2,141	
TOTAL			$2,141

TASK 3 - Repair of XM-33 Type Shipping Containers (10-14-65)

60.400.477	RAS135	$1,628	
TOTAL			$1,628

TASK 4 - Lifting Bands for Castor Rocket Motor Shipping Containers (11-18-65)

60.400.491	RAS125	$760	
TOTAL			$760

TASK 5 - Quantitative Analysis of the Castor IIA Nozzle (3-7-66)

60.400.497	RAS135	$5,000	
60.400.525	RAS135	1,000	
60.400.551	RAS135	1,128	
TOTAL			$7,128

TASK 6 - Dummy TX354 Rocket Motor Assembly (5-10-66)

60.400.537	RAS110	$2,900	
60.400.591	RAS110	1,600	
TOTAL			$4,500

TABLE CXXXIV Concluded - SCOUT - NAS1-4793 (CONTRACT HISTORY)
THIOKOL CHEMICAL CORPORATION

TASK 7 - Spare Parts for Castor Rocket Motors (7-6-66)

	60.400.575	RAS125	$ 800	
	60.400.607	RAS125	1,699	
TOTAL				$2,499

TASK 8 - Repair of Castor Pyrogens (10-28-66)

	60.400.632	RAS125	$1,052	
TOTAL				$1,052

TASK 9 - Removal of Propellant from One Castor II Rocket Motor (10-31-66)

	60.400.639	RAS125	$4,212	
TOTAL				$4,212
		TOTAL CONTRACT		$26,600
		TOTAL FUNDED		$26,600

TABLE CXXXV - SCOUT - NAS1-4794 (CONTRACT HISTORY)
AEROJET GENERAL CORPORATION

TASK 1 - Inspection of Aerojet Junior Rocket Motors (6-22-65)

	61.100.734 (NOT SCOUT)	RJ1498	$13,089	
TOTAL				$13,089

TASK 2 - Shipment of Algol IIB Rocket Motors (10-14-65)

	60.400.473	RAS125	$1,000	
	60.400.474	RAS125	1,000	
TOTAL				$2,000

TASK 3 - Shipment of Algol IIB Rocket Motor (12-3-65)

	60.400.515	RAS211	$2,000	
TOTAL				$2,000

TASK 4 - Storage and Preparation for Shipment of Algol IIB Rocket Motors (2-10-66)

	60.400.370	RAS204	$8,253	
	60.400.370	RAS207	10,747	
	60.400.430	RAS125	6,321	
	60.400.541	RAS125	3,368	
M-1 (Mod. Algol)	60.400.646	RAS140	200	
IN PROCESS				
CCN-2 $400				
SUBTOTAL				$ 400
TOTAL				$29,289

TASK 5 - Scout Propulsion System Algol Technical Support (4-8-66)

	60.400.509	RAS135	$25,483	
TOTAL				$25,483

TASK 6 - X-Ray Inspection of Algol Rocket Motor No. IIB-39 (4-13-66)

	60.400.567	RAS204	$2,650	
TOTAL				$2,650

TABLE CXXXV Concluded - SCOUT - NAS1-4794 (CONTRACT HISTORY)
AEROJET GENERAL CORPORATION

TASK 7 - Spare Components Algol IIB Rocket Motors (6-17-66)

	60.400.536	RAS110	$500	
	60.400.576	RAS125	50	
TOTAL				$ 550

TASK 8 - Radiographic Inspection Algol IIB-42 Rocket Motor (6-21-66)

	60.400.600	RAS125	$2,650	
TOTAL				$ 2,650

TASK 9 - Modification of Algol Handling Dollies (3-1-67)

	60.400.619	RAS125	$3,150	
	60.400.673	RAS149	1,550	
M-1 (Mod. Algol Dollies)	0	0	0	
M-2 (Mod. Algol Dollies)	60.400.783	RAS125	2,800	
	60.400.811	RAS162	1,100	
TOTAL				8,600

TASK 10 - Surveillance Testing of Algol IIB Squib Retainer Assemblies (3-8-67)

	60.400.685	RAS148	$4,502	
TOTAL				$ 4,502
			TOTAL CONTRACT	$90,813

TABLE CXXXVI - SCOUT - NAS1-4795 (TASK CONTRACT HISTORY)
HERCULES INCORPORATION

TASK 1 - Fabrication and Test of X-258 Handling Fixtures (6-30-65)

	20.200.717	RAS126	$ 2,064	
	20.200.717	RAS127	2,064	
TOTAL				$ 4,128

TASK 2 - Scout Propulsion System X-258 and X-259 Technical Support (11-4-65)

	60.400.350	RAS118	$25,000	
	60.400.475	RAS135	62,329	
M-1 (Manhour Increase)	60.400.630	RAS149	$22,460	
	60.400.636	RAS149	9,288	
M-2 (Gov't Furnished Property)			0	
M-3 (Overhead Rate Adj.)	60.400.719	RAS149	5,102	
TOTAL				$124,179

TASK 3 - Modification of X-259 Rocket Motors (11-1-65)

Wasp Motors	Transferred
151	Scout 152
163	Scout 154
178	Tested

	60.400.349	RAS118	$ 6,000	
	60.400.374	RAS212	28,400	
M-1 (Mod.X-259 Rkt.Mtr.)	60.400.519	RAS125	3,000	
	60.400.579	RAS125	984	
M-2 (Gov't Furnished Property)			0	
TOTAL				$ 38,384

TASK 4 - Installation of Tunnel Tabs on X-259 Chambers (11-23-65)

	60.400.397	RAS124	$ 4,800	
M-1 (Tunnel Tabs)	60.400.527	RAS133	800	
	60.400.580	RAS133	1,000	
TOTAL				$ 6,600

TABLE CXXXVI Concluded - SCOUT - NAS1-4795 (TASK CONTRACT HISTORY)
HERCULES INCORPORATION

TASK 5 - X-258 and X-259 Documentation Review (12-14-65)

	60.400.403	RAS125	$ 55,000	
	60.400.495	RAS125	20,690	
M-1 (Change in Scope)			0	
M-2 (X-258, X-259 Doc. Review)	60.400.589	RAS125	2,400	
	60.400.611	RAS125	1,326	
M-3 (X-258, X-259 Doc. Review)	60.400.590	RAS125	33,000	
	60.400.725	RAS125	20,665	
TOTAL				$133,081

TASK 6 - Dummy X-259 Rocket Motor (6-16-66)

	60.400.538	RAS110	$ 5,000	
M-1 (Change to Documentation)			0	
TOTAL				$ 5,000

TASK 7 - Spare X-258 and X-259 Rocket Motors (8-15-66)

	60.400.577	RAS125	$ 240	
	60.400.610	RAS125	1,288	
TOTAL				$ 1,528

TASK 8 - Modification of X-259 Rocket Motors (9-12-66)

	60.400.623	RAS125	$10,415	
M-1 (Change in Del.Date)	60.400.732	RAS125	3,398	
TOTAL				$ 13,813

TASK 9 - Rework of X-259 Nozzles (1-20-67)

	60.400.627	RAS204	$ 5,645	
TOTAL				$ 5,645

TASK 10 - Scout Propulsion System X-258 and X-259 Tech. Support (11-7-66)

	60.400.629	RAS149	$23,500	
M-1 (Tech. Support	60.400.678	RAS149	58,955	
M-2 (Tech. Support)	60.400.709	RAS149	37,000	
	60.400.730	RAS149	16,577	
M-3 (Govt. Furn. Mat.)			0	
M-4 (Tech. Support)	60.400.749	RAS149	5,882	
TOTAL				$141,914
		TOTAL CONTRACT		$474,272

TABLE CXXXVII - SCOUT NAS1-5034 (CONTRACT HISTORY)
THIOKOL CHEMICAL CORPORATION

AMENDMENT		PROFIT	COST
Contract	$1,232,941	$114,606	$1,347,547
8 Nozzle Forgings			
8 Motor Chambers			
2 IIA Igniters			
2 IE5 Igniters			
30 M-125 Initiators			
2 IE5 Castor Motors			
534 Storage			
535 Storage			
13 IIA Castor Motors			
16 Assigned S-143			
17 Assigned S-142			
18 Assigned S-146			
19 Assigned S-147			
20 Assigned S-145			
21 Assigned S-148			
29 Assigned S-151			
23 S-131			
24 S-140			
25 Assigned S-149			
26 Assigned S-152			
27 Assigned S-150			
28 Assigned S-153			
1 (CCN-1)	$ 8,655	$ 866	$ 9,521
2 (CCN-2) Castor II Nozzle Invest.	2,649	265	
(CCN-3) Castor II Nozzle Mod.	57	573	
			$ 3,544
3 (CCN-4) Castor II Nozzles	0	0	0
4 Underrun	$ -3,375	$ 166	$ -3,209
		TOTAL CONTRACT	$1,357,403

TABLE CXXXVIII - SCOUT - NAS1-5592 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

	Target Cost	Target Fee	Total Obligated
Contract	$ 338,976	$27,950	$ 366,926
Mod. 1 (CCN-1)	181,468	14,220	195,688
Mod. 2 (CCN-2)	23,019	1,781	24,800
Mod. 3 Roll Alinement	43,429	3,583	47,012
Mod. 4 IRP Alinement	67,830	6,278	74,108
Mod. 5 3rd & 4th Stage Initiators	72,961	5,343	78,304
Mod. 6 Vehicle Roll Compensation	54,028	4,668	58,696
Mod. 7 Igniter Algol IIB	295,201	14,825	310,026
Mod. 8 (CCN-3)	11,679	687	12,366
Mod. 9 (-40 H.S.) (CCN-4)	12,407 20,763	1,023 1,785	35,978
Mod. 10 Decrease	-(10,086)	-(832)	-(10,918)
Mod. 11 Administrative Change	0	0	0
Mod. 12 Apollo Initiators	27,850	2,033	29,883
Mod. 13 Overrun (Estimated)			22,783
Mod. 14 Third- and Fourth-Stage Initiator Program	10,080	735	10,815
Mod. 15 (CCN-5)	336	24	360
Mod. 16 Extension of Completion Date	0	0	0
Mod. 17 Overrun			23,776
Mod. 18 Extension of Completion Date	0	0	0
Mod. 19 Contractor's Division Name Change	0	0	0
Mod. 20 Apollo Initiators	1,369	116	9,391
ESTIMATED TOTAL CONTRACT	$1,151,310	$84,219	$1,289,994
ESTIMATED OVERRUN	64,077	-9,612	0
TOTAL ESTIMATED COST	$1,215,387	$74,607	$1,289,994

TABLE CXXXIX - SCOUT - NAS1-5610 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract			TOTAL
	15 Scout Vehicles less Motors	$6,901,500	
	Scout 163		
	Scout 164		
	Scout 165		
	Scout 166		
	Scout 167		
	Scout 168		
	Scout 169		
	Scout 170		
	Scout 171		
	Scout 172		
	Scout 173		
	Scout 174		
	Scout 175		
	Scout 176		
	Scout 177		
	1 Transition C Structure	18,350	
	1 Transition Lower D Structure	6,655	
	1 Heat Shield	16,500	
	17 Algol Rocket Motors (1 Q.A.)	2,160,700	
	IIB-59 Assigned Scout 161		
	IIB-60 Assigned Scout 168		
	IIB-61 Assigned Test		
	IIB-62 Assigned Scout 160		
	IIB-63 Assigned Scout 172		
	IIB-64 Assigned Scout 167		
	IIB-65 Assigned Scout 164		
	IIB-66 Assigned Scout 175		
	IIB-67 Assigned Scout 169		
	IIB-68 Assigned Scout 174		
	IIB-69 Assigned Scout 163		
	IIB-70 Assigned Scout 178		
	IIB-71 Assigned Scout 170		
	IIB-72 Assigned Scout 171		
	IIB-73 Assigned Scout 165		
	IIB-74 Assigned Scout 173		
	IIB-75 Assigned Scout 176		
	3 Algol Nozzle Assemblies (Spare)	52,140	
	4 Algol Igniter Assemblies (Spare)	3,340	
	2 Algol Squib Retainers (Spare)	352	
	2 Algol Nozzle Leak-Check Tooling	1,490	

TABLE CXXXIX Continued - SCOUT - NAS1-5610 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract	TOTAL
15 Castor II Rocket Motors	$1,495,200
170 Assigned Scout 162	
171 H-Assigned Scout 169	
172 H-Assigned Scout 165	
173 Assigned Scout 167	
174 Assigned Scout 164	
175 Assigned Scout 174	
176 Assigned Scout 171	
177 Test	
178 Assigned Scout 163	
179 Assigned Scout 172	
180 Assigned Scout 175	
181 Assigned Scout 177	
182 Assigned Scout 173	
183 Assigned Scout 166	
184 Assigned Scout 176	
1 Castor Pyrogen Igniter (Spare)	1,693
16 Antares X-259 Motors	912,960
B3-211 Reject - Test, AEDC	
B3-212 Assigned Scout 158	
B3-213 Assigned Scout 162	
B3-214 Assigned Scout 172	
B3-215 Assigned Scout 165	
B3-216 Assigned Scout 167	
B3-217 Assigned Scout 169	
B3-218 Assigned Scout 174	
B3-219 Assigned Scout 176	
B3-220 Assigned Scout 157	
B3-221 Assigned Scout 171	
B3-222 Test, AEDC	
B3-223 Assigned Scout 177	
B3-224 Assigned Scout 173	
B3-225 Assigned Scout 144	
B3-226 Assigned Scout 175	
16 FW-4S Motors	529,120
2223-1 Assigned Scout 167	
2223-2 Assigned Scout 168	
2223-3 Assigned Scout 174	
2223-4 Assigned Scout 165	
2223-5 Assigned Scout 169	
2223-6 Assigned Scout 172	
2223-7 Assigned Scout 177	
2223-8 Assigned Scout 144	
2223-9 Assigned Scout 171	
2223-10 Assigned Scout 175	

TABLE CXXXIX Continued - SCOUT - NAS1-5610 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Amendments				TOTAL
	Contract, Continued			
	16 FW-4S Motors - continued			
	2223-11 Assigned Scout 166			
	2223-12 Assigned Scout 185			
	2223-13 Assigned Scout 183			
	2223-14 Assigned Scout 173			
	2223-15 Assigned Scout 180			
	2223-16 Assigned Scout 163			
				$12,100,000
M-1	60.400.443	RAS140 (Funding Decrease)	-$1,000,000	
M-2	60.400.443	RAS219 (Funding)	1,000,000	
	60.400.621	RAS219 (Funding)	100,000	
		RAS300 (Funding)	1,200,000	
		RAS140 (Funding	800.000	
M-3	60.400.677	RAS219	34,695	
				34.695
M-4	(CCN's 1, 2, 5)			
	60.400.443	RAS140	-5,100	
	60.400.659	RAS219	6,500	
	60.400.682	RAS140	2,114	
				3,514
M-5	Admin. Change		0	0
M-6	(CCN's 6, 8, 9) Deletion Initiators		0	0
M-7	(CCN's 3, 10)			
	60.400.656	RAS148	23,696	
	60.400.724	RAS219	7,480	
	60.400.759	RAS140	38,750	
	60.400.760	RAS140	6,510	
				76,436
M-8	(CCN's 7, 12, 13)			
	60.400.751	RAS125	9,500	
	60.400.766	RAS125	2,400	
	60.400.829	RAS140	11,950	
				23,850

TABLE CXXXIX Concluded - SCOUT - NAS1-5610 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Amendments				TOTAL
	Contract, Continued			
M-9	(CCN's 4, 14, 15)			
	60.400.679	RAS219	$ 1,000	
	60.400.795	RAS219	1,000	
	60.400.830	RAS140	4,600	
	60.400.832	RAS140	2,300	
				$ 8,900
M-10	(CCN's 16,17)			
	60.400.809	RAS164	$ 10,500	
	60.400.813	RAS163	54,000	
	60.400.870	RAS174	2,630	
				$ 67,130
M-11	(See M-15)		$ 0	$ 0
M-12	(See M-15)		$ 0	$ 0
M-13	60.400.890	RAS159	$ 3,205	$ 3,205
M-14	Delivery Schedule Change		$ 0	$ 0
M-15	(M's 11, 12)			
	60.400.875	RAS219	$ 1,257	$ 1,257
M-16	60.400.914	RAS140	$ 24,846	$ 24,846
			TOTAL CONTRACT	$12,343,833
			TOTAL FUNDED	$12,343,833

TABLE CXL - CONTRACT NAS1-5610 - FINAL PRORATION OF COSTS

ITEM	PHASE IV			PHASE V			PHASE VI			TOTAL
	NASA	NAVY	AIR FORCE	NASA	NAVY	ESRO	NASA	NAVY	ESRO	
Vehicles Less Motors:										
Scout 163				$460,100						$460,100
Scout 164				460,100						460,100
Scout 165				460,100						460,100
Scout 166				460,100						460,100
Scout 167				460,100						460,100
Scout 168				460,100						460,100
Scout 169				460,100						460,100
Scout 170				460,100						460,100
Scout 171				460,100						460,100
Scout 172						$460,100				460,100
Scout 173				460,100						460,100
Scout 174				460,100						460,100
Scout 175				460,100						460,100
Scout 176					460,100					460,100
Scout 177				460,100						460,100
1 Transition E-Structure				15,904	1,223	1,223				18,350
1 Transition Lower D-Structure				5,767	444	444				6,655
1 Heat Shield				14,300	1,100	1,100				16,500
Mod. 3 Autodestruct Module				30,069	2,313	2,313				34,695
Mod. 7 Fifth-Stage Mods.							$ 38,750			38,750
Mod. 7 Convert to S.S. Tubes				5,642	434	434				6,510
Mod. 9, CCN 15:Temp.Meas. 8 Vehs.				2,476	412	412				3,300
Algol Rocket Motors:										
11B-59 on Scout 161	$135,042									135,042
11B-60 on Scout 168				135,044						135,044
*11B-61 Test Motor										
11B-62 on Scout 160	135,042									135,042
11B-63 on Scout 172						135,044				135,044
11B-64 on Scout 167				135,044						135,044
11B-65 on Scout 164				135,044						135,044
11B-66 on Scout 175				135,044						135,044
11B-67 on Scout 169				135,044						135,044
11B-68 on Scout 174				135,044						135,044
11B-69 on Scout 163				$135,044						135,044
11B-70 on Scout 178								$135,044		135,044
11B-71 on Scout 166				135,044						135,044
11B-72 on Scout 171				135,044						135,044
11B-73 on Scout 165				135,044						135,044
11B-74 on Scout 173				135,044						135,044
11B-75 on Scout 176					$135,044					135,044
3 Algol Nozzle Assys. (Spare)	$ 6,518			35,845	3,259	$ 3,249		3,259		52,140
4 Algol Igniter Assys. (Spare)	418			2,295	209	209		209		3,340
2 Algol Squib Retainers (Spare)	44			242	22	22		22		352
2 Algol Nozzle Leak Chk.Tooling	186			1,025	93	93		93		1,490
Mod. 4, CCN2: Pkg. Algol Initiators	1,077			5,923	538	538		538		8,614
Mod. 9, CCN4: Pkg.Squib Ret.Assys.	700			3,850	350	350		350		5,600
Mod 13, Storage of Algols	401			2,204	200	200		200		3,205
Castor II Rocket Motors:										
170 on S-162				106,800						106,800
171 on S-169				106,800						106,800
172 on S-165				106,800						106,800
173 on S-167				106,800						106,800
174 on S-164				106,800						106,800
175 on S-174				106,800						106,800
176 on S-171				106,800						106,800
*177 Test Motor										
178 on S-163				106,800						106,800
179 on S-172						106,800				106,800
180 on S-175				106,800						106,800
181 on S-177				106,800						106,800
182 on S-173				106,800						106,800
183 on S-166				106,800						106,800
184 on S-176					106,800					106,800
1 Castor Pyrogen Igniter (Spare)				1,451	121	121				1,693
Mod. 4, CCN5: GFP Castor Case				-4,370	-365	-365				-5,100

---

*Prorated.

TABLE CXL Concluded - CONTRACT NAS1-5610 - FINAL PRORATION OF COSTS

ITEM	PHASE IV			PHASE V			PHASE VI			TOTAL
	NASA	NAVY	AIR FORCE	NASA	NAVY	ESRO	NASA	NAVY	ESRO	
X-259 Rocket Motors:										
*B3-211 Test Motor										
B3-212 on S-158			$ 65,211							$ 65,211
B3-213 on S-162		$ 65,211								65,211
B3-214 on S-172						$ 65,212				65,212
B3-215 on S-165				$ 65,211						65,211
B3-216 on S-167				65,211						65,211
B3-217 on S-169				65,211						65,211
B3-218 on S-174				65,211						65,211
B3-219 on S-176					$ 65,212					65,212
B3-220 on S-157		65,211								65,211
B3-221 on S-171				65,211						65,211
*B3-222 Test Motor										
B3-223 on S-177				65,212						65,212
B3-224 on S-173				65,212						65,212
B3-225 on S-144				65,212						65,212
B3-226 on S-175				65,212						65,212
Mod. 7, CCN 10:Repair Containers		1,069	534	4,809	534	534				7,480
Mod. 8, CCN 12: 3rd & 4th Stg. (also on FW4S) Initiators		1,429	714	6,429	714	714				10,000
Mod. 8, CCN 13:Mod Last 8 Exit Cones		482		2,886	482					3,[illegible]
FW4S Rocket Motors:										
2223-1 on S-167				33,070						33,070
2223-2 on S-168				33,070						33,070
2223-3 on S-174				33,070						33,070
2223-4 on S-165				33,070						33,070
2223-5 on S-169				33,070						33,070
2223-6 on S-172						33,070				33,070
2223-7 on S-177				33,070						33,070
2223-8 on S-144				33,070						33,070
2223-9 on S-171				33,070						33,070
2223-10 on S-175				33,070						33,070
2223-11 on S-166				33,070						33,070
2223-12 on S-183							$ 33,070			33,070
2223-13 on S-185									$ 33,070	33,070
2223-14 on S-173				$ 33,070						33,070
2223-15 on S-180							33,070			33,070
2223-16 on S-163				33,070						33,070
Mod. 7, CCN3:NDT on FW4S Nozzle Inserts				17,772		$ 1,481	2,962		1,481	23,696
Mod. 8, CCN 12: (also on X-259): 3rd & 4th Stg. Initiators				7,500		625	1,250		625	10,000
Mod. 10, CCN 16: Reinforce Nozzles				40,500		3,375	6,750		3,375	54,000
Mod. 10, CCN 17: Test Ship Conts				9,847		821	1,641		821	13,130
Mod. 15, CCN 12:Leak Test 12 Noz				838		105	209		105	1,257
Mod. 16:Refurbish Tooling				18,634		1,553	3,106		1,553	24,846
GRAND TOTAL	$279,428	$133,402	$66,459	$9,963,965	$779,239	$819,787	$120,808	$139,715	$ 41,030	$12,343,833

TABLE CXLI - FUNDING OF CONTRACT NAS1-5610

(Includes Modification of 16)

PROPORTION	FUNDS-FY	PHASE IV	PHASE V	PHASE VI	TOTAL
		$479,288.00	$11,573,977.33	$290,567,67	$12,343,833.00
(13/15)	(490)				
	RAS125-65		(188,306.52)		
	RAS125-66		(70,259.58)		
	RAS125-67		(7,625.00)	(1,875.00)	
	RAS125-68	(636.00)	(2,400.00	(8,973.38)	
	RAS140-66	(127,100.00)	(1,097,267.73)		
	RAS140-67	(151,692.00)	(3,590,894.15)	(48,910.12)	
	RAS140-68		(297,939.33)	(12,901.00)	
	RAS140-69		(44,596.07)	(4,659.00)	
	RAS140-70		(1,145,405.07)		
	RAS159-69		(3,205.00)		
	RAS159-70		(674,180.74)	(41,490.00)	
	RAS174-69		(2,269.54)		
	RAS204-63	(6,856.92)			
	RAS204-65	(6,756.46			
	RAS204-66	(1.00)			
	RAS204-69	(52,844.62)			
	RAS211-63		(18,548.00)		
	RAS219-67	(133,401.00)	(790,691.50)	(139,715.00)	
	(497)				
	RAS124-65		(2,807,159.81)		
	RAS148-67		(21,519.00)	(1,481.00)	
	RAS163-68		(1,056.46)		
	RAS164-68		(10,500.00)		
	(984)				
	RAS300-70		(830,253.83)		
	RAS302-71			(30,563.17)	
	TOTAL	$479,288.00	$11,573,977.33	$290,567.67	$12,343,833.00
	AIR FORCE	$ 66,459.00	$ 0	$ 0	$ 66,459.00
	NAVY	133,401.00	779,239.50	$139,715.00	1,052,355.50
	ESRO	0	830,253.83	30,563.17	860,817.00
	NASA	279,428.00	9,964,484.00	120,289.50	10,364,201.50
	TOTAL	$479,288.00	$11,573,977.33	$290,567.67	$12,343,833.00

TABLE CXLII - SCOUT - NAS1-5880 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

			Scope	Fee	Total
Contract			$207,900	$14,500	$222,400
S-946/LPT	8-5-66	Tech. assist. of one EGSE Engr. in Africa from Aug. 22 to Oct. 28, 1966			
S-943/LPT	8-5-66	San Marco Project engineer to attend program meetings in Rome and Africa			
S-1227/LPT	9-7-66	Tech. assist. of one MGSE engineer from Sept. 19 through Nov. 18			
S-1359/LPT	10-5-66	Tech. support for shipment of vehicles and motors to Africa			
S-1360/LPT	10-5-66	Continue change documentation support: (a) Veh. and GSE; (b) drafting and design manual and processing specs; (c) standard operating procedures			
S-1361/LPT	10-6-66	Continue EGSE engr. support of S-946 to Nov. 1			
S-1362/LPT	10-7-66	Provide pseudo S-144 preflight report			
S-1600/LPT	11-15-66	Tech. assist. of off-site coordinator from Nov. 28 through S-153 launch; also continue MGSE engr. support of S-1227 through Dec. 1			
S-1371/LPT	11-29-66	Tech. assist. of one EGSE engr. from Dec. 12, 1966, to Feb. 15, 1967			
S-1610/LPT	1-12-67	Prepare San Marco spares procedure document; and project engr. travel to discuss document with CRA			
S-1383/LPT	1-17-67	Tech. assist. of instrumentation engr. and guidance engr. from Feb. 1, 1967, veh.-mech. technician from Feb. 6 through S-153 launch			
S-1385/LPT	1-19-67	Change reporting date of veh.-mech. technician of S-1383 from Feb. 6 to Feb. 1			

TABLE CXLII Continued - SCOUT - NAS1-5880 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract Continued			Scope	Fee	Total
S-1387/LPT	1-26-67	Provide San Marco communications format			
S-1618/RDE	2-14-67	Design an FW4S nozzle fixture			
S-1622/RDE	2-20-67	Supply 3 sets of SOP data sheets			
S-1621/RDE	2-20-67	Extend EGSE engr. of S-1371 from Feb. 15, 1967, indefinitely; provide quality engr., ignition engr., and propulsion engr. approximately March 1			
S-1396/LPT	3-7-67	Fabricate FW4S alinement fixture and provide procedures			
S-1398/LPT	3-8-67	Provide nominals for communications format of S-1387 and engr. at GSFC for operations			
S-1399/LPT	3-10-67	Update S-153 preflight planning rpt. and trajectory data			
S-1852/LPT	3-20-67	Stop fabrication of FW4S alinement fixture of S-1396			
S-1645/LPT	3-23-67	Provide EGSE engr. replacement through S-153 launch			
S-1649/RDE	3-29-67	Provide individual to replace FW4S nozzle			
S-1840/LPT	4-6-67	Provide countdown coordinator and San Marco project engr. liaison through S-153 launch			
S-1857/LPT	4-10-67	Change of address of S-1360 change documentation support			
S-1673/JRH	4-27-67	Provide set of flight batteries			
S-1861/LPT	5-10-67	Prepare documents covering San Marco future operations			
S-1863/LPT	5-12-67	Provide T9SD crystal			

TABLE CXLII Continued - SCOUT - NAS1-5880 (CONTRACT HISTORY) LTV AEROSPACE CORPORATION

Contract Continued			Scope	Fee	Total
M-1		Overrun	$ 26,504	$ 0	$ 26,504
S-1874/LPT	7-7-67	Mechanical engineer for technical support to CRA at San Marco range			
M-2		Overrun	$112,171	$ 0	$112,171
S-2124/LRF	9-20-67	Electronics engineer for technical support to CRA at San Marco range (60 days)			
S-2301/LRF	11-27-67	Support CRA concerning fabrication of Scout hardware			
S-2306/LRF	12-6-67	Program Plan for fabrication of Scout vehicle hardware in Italy			
M-3		Extension of Completion Date	$ 0	$ 0	$ 0
S-2338/LRF	1-18-68	Feasibility study for despin system on E section. Provide CRA with S-band T/M information			
S-2355/LRF	2-14-68	Development of San Marco/Scout range manual			
S-2363/LRF	2-27-68	Project engineer for technical survey of San Marco range (2 weeks)			
S-2366/LRF	3-7-68	One mechanical and one electrical GSE engineer to support CRA in launch complex checkout at San Marco range (60 days)			
S-2383/LRF	3-26-68	Resources estimate for E section and San Marco separation system			
S-2483/LRF	5-6-68	Project engineer to Rome to attend technical meetings (1 week)			
S-2496/LRF	6-3-68	Environmental study concerning A/C requirements for San Marco range platforms. Environmental study for Class II clean room for San Marco complex			

TABLE CXLII Continued - SCOUT - NAS1-5880 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract Continued			Scope	Fee	Total
M-3 Continued					
S-2542/LRF	9-6-68	Project engineer to participate in range survey and GSFC review of San Marco range (3 weeks)			
S-2623/LRF	10-1-68	Refurbishment of San Marco separation systems B-11 and B-12			
S-2646/LRF	12-2-68	Develop shipping procedures report for San Marco range users			
S-2571/LRF	12-5-68	Furnish Scout S-band T/M data to Scientific Atlanta, Inc., for T/M ground station at San Marco range			
M-4		Increase in Maximum Materials Cost	$ 0	$ 0	$ 0
S-2762/LRF	1-20-69	Technical representative of CCA and LTV engineer to San Marco range for evaluation of C/D transmitter (1 week)			
S-2766/LRF	1-27-69	Make S-178 and subsequent vehicle change definition			
S-2767/LRF	1-27-69	Circular and elliptic orbit performance data for 80°-130° launch azimuths			
S-2782/LRF	3-24-69	Structural survey of Santa Rita platform by LeTourneau Corporation (3 weeks)			
S-2783/LRF	3-24-69	Provide requirements for incorporating Whittaker gyro in S-163 and Sub.			
S-2784/LRF	3-24-69	Project engineer to participate in San Marco range survey			
S-2785/LRF	3-24-69	Structural engineer to support motor shipping container modifications			
S-2790/LRF	4-1-69	Development of program for training CRA personnel at Wallops			

TABLE CXLII Continued - SCOUT - NAS1-5880 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract Continued			Scope	Fee	Total
M-5		Extension of San Marco support for 12 more months	$192,100	$13,500	$205,600
S-2798/LRF	4-24-69	Publish San Marco range shipping manual			
S-2902/LRF	5-8-69	Furnish one set of vehicle S-173C drawings to CRA			
S-2907/LRF	5-14-69	Review of C/D transmitter recommendations submitted by CCA Electronics			
S-2915/LRF	5-27-69	Project engineer to visit San Marco range and attend working group meeting in Rome (2 weeks)			
S-2925/LRF	6-11-69	S-173C logbook and vehicle processing history review with CRA			
S-2924/LRF	6-19-69	Provide technical support for shipment of vehicle S-173C and motors to San Marco range			
S-3017/LRF	9-5-69	Electrical engineer to San Marco range to assist CRA in S-163 and Sub. modifications (60 days)			
S-2972/LRF	9-11-69	Compile San Marco functional schematics book for CRA			
S-2978/LRF	9-26-69	Update S-178 and Sub. report for San Marco range			
S-4023/LRF	1-12-70	Electronics engineer to Wallops to support range safety training of CRA (2 days)			
S-2748/LRF	2-2-70	Project engineer to survey San Marco range (1 week)			
S-4066/LRF	2-20-70	Develop Scout pyrotechnic report for San Marco range			

TABLE CXLII Concluded - SCOUT - NAS1-5880 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Contract Continued

M-5 Continued

			Scope	Fee	Total
S-4060/LRF	3-11-70	Project engineer to participate in San Marco launch complex validation (3 weeks)			
S-6017/LRF	4-11-70	Develop range maintenance log; review clean room design			
S-6019/LRF	4-30-70	Clean and passivate H_2O_2 components			
S-6023/LRF	5-12-70	Project engineer to inspect range June 15 through June 20			
S-7065/LRF	7-13-70	Rework motor shipping vans			
S-7093/LRF	8-4-70	Build Base A container			
S-7094/LRF	8-4-70	Contractor to compile report on San Marco range development			
S-8048/LRF	8-6-70	Provide technical support for H_2O_2 component installation at San Marco range			
S-8058/LRF	8-25-70	Provide technical support to San Marco range in operations, guidance, quality, GSE, mechanical and pyrotechnic areas			
S-8064/LRF	8-27-70	Revise San Marco range user's manual			
M-6		Extension of San Marco support for 6½ months	$ 90,800	$ 6,360	$ 97,160
M-7		Increase in Material Costs	$ 0	$ 0	$ 0
M-8		Increase in Material Costs	$ 23,364	$ 1,636	$ 25,000
		TOTAL CONTRACT			$688,835

TABLE CXLIII - SCOUT - NAS1-5883 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

	TOTAL
Contract	
Second Stage - 10 Castor IIA Motors	$977,400
96 Assigned Scout 157	
97 Assigned Scout 160	
98 Scout 154	
99 Test (Case to LRC Show)	
100 Scout 155	
101 Assigned Scout 159	
102 Scout 156	
103 Assigned Scout 161	
104 Assigned Scout 168	
105 Assigned Scout 158	
Castor Spare Nozzle	10,976
Third Stage - 10 X-259 Motors	586,510
A3-201 Scout 156	
A3-202 Scout 155	
A3-203 Test-AEDC (Case to LRC Show)	
A3-204 Reject	
B3-205 Assigned Scout 159	
B3-206 Assigned Scout 160	
B3-207 Assigned Scout 161	
B3-208 Reject	
BE-209 Assigned Scout 164	
BE-210 Assigned Scout 168	
2 X-259 Igniters	6,420
2 X-259 Chambers	33,672
Fourth Stage - 10 FW4S Motors	457,790
30201 Scout 150	
30202 Scout 153	
*30203 Reject	
30204 Scout 151	
30205 Test - LRC	
30206 Scout 152	
30207 Scout 159	
30208 Test	
**30209 Reject	
30210 Assigned Scout 158	
30211 Case Rejected	
30212 Case Rejected	
30213 Case Rejected	
2218-8 Assigned Scout 160	
2218-9 Test - Tullahoma	
2218-10 Assigned Scout 161	

---

*Replaced with 2218-9 at no charge.

**Replaced with 2218-10 at no charge.

TABLE CXLIII Continued - SCOUT - NAS1-5883 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

			TOTAL
Contract Continued	10 Initiators (FW4)	$ 3,900	
	2 FW4 Igniters	1,168	
	1 FW4 Nozzle Assy.	3,374	
	6 X-258 Motors	353,790	
	E6-138 Air Force - SATAR		
	E6-139 Scout 156		
	E6-140 Delta-18		
	E6-141 Delta-19		
	*E6-142 Reject		
	E6-143 Scout 155		
			$2,435,000
Amendments			
M-1		0	0
CCN-1, 1A		$ -5,981	
CCN-2		0	
CCN-3		0	
CCN-6		-3,766	
CCN-7		331	
		551	
M-2			$ -8,865
M-3	8 X-258 Motors	$481,000	$ 481,000
	E5-144 Reject		
	E5-145 Scout 162		
	E5-146 Reject		
	E5-147 (Shelf Life Test)		
	E5-148 Assigned Scout 179		
	E5-149 Scout 176		
	E5-150 Scout 178		
	E5-151 Assigned Scout 192		
	**E5-152 Assigned-Scout 197		
	**E5-160 Canceled (Case Tested)		
CCN-4		$ 7,000	
CCN-10		0	
CCN-12		-7,000	
M-4			$ 0

---

*142 replaced by 161; bought under NAS1-6020-19(call 37) for testing ($20,000).
**152 replaced E5-146; 160 replaced E5-144.

TABLE CXLIII Concluded - SCOUT - NAS1-5883 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Amendments Continued

			TOTAL
M-5	5 X-258 Motors E5-153 Canceled E6-156 Canceled E5-157 Canceled E6-158 Canceled E5-159 Canceled	$251,108	$ 251,108
CCN-5		$ 18,712	
CCN-9		534,380	
CCN-11		4,415	
M-6			$ 557,507
CCN-8		$ 0	
CCN-13		25,200	
CCN-14		0	
CCN-15		0	
CCN-17		0	
M-7			$ 25,200
CCN-16 (Canceled)		$ 0	
M-8			$ 0
M-9	Deletion of X-259 Rocket Mtr. S/N HIB-208	$ -2,800	-2,800
M-10	Cancel 6 X-258 Motors (156thru 160 & 153)	$-192,875	$ -192,875
M-11	Contractor Division Name Change		$ 0
M-12	Termination Costs for Deleting 6 X-258 Motors	$ 146,000	$ 146,000
	TOTAL CONTRACT		$3,691,275

TABLE CXLIV - FUNDING OF CONTRACT NAS1-5883

	PHASE IV	PHASE V	TOTAL
SECOND STAGE			
490-6	$ 95,636.00	$ 97,740.00	$ 193,376.00
490-7	541,668.00	0	541,668.00
SUBTOTAL	$ 637,304.00	$ 97,740.00	$ 735,044.00
THIRD STAGE			
490-6	$ 567,951.00	$ 58,651.00	$ 626,602.00
497-7	527.00	0	527.00
62-6-6	7,355.00	0	7,355.00
62-6-7	-7,000.00	0	-7,000.00
66-95-7	0	-2,800.00	-2,800.00
SUBTOTAL	$ 568,833.00	$ 55,851.00	$ 624,684.00
FOURTH STAGE			
490-6	$ 859,486.00	$ 0	$ 859,486.00
497-7	49,000.00	0	49,000.00
490-8	0	2,400.00	2,400.00
497-8	177,092.00	0	177,092.00
62-6-7	310,536.00	0	310,536.00
63-44-8	3,150.00	0	3,150.00
66-87-7	248,000.00	0	248,000.00
66-95-7	144,100.00	446,403.74	590,503.74
66-95-8	0	91,379.26	91,379.26
SUBTOTAL	$1,791,364.00	$ 540,183.00	$2,331,547.00
TOTAL	$2,997,501.00	$ 693,774.00	$3,691,275.00

TABLE CXLV - SCOUT - NAS1-6020 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK	TARGET COST	TARGET PROFIT	TARGET PRICE
A. Administration	$1,885,272	$185,699	$2,070,971
B. Payload-02	200,039	19,704	219,743
C. Preflight Planning-02	268,077	26,406	294,483
D. Data Analysis-02	759,858	74,846	834,704
E. Systems Engineering-02	1,861,123	183,314	2,044,437
F. Reliability-02	1,235,272	121,675	1,356,947
G. Standardization-02	797,591	78,564	876,155
H. Support to Veh. Checkout (Phase IV)-01	394,574	38,866	433,440
J. Vehicle Modifications & Checkout-01	732,964	72,197	805,161
K. Vehicle Checkout (Phase V)-01	1,151,123	113,387	1,264,510
L. Logistics-01	459,907	45,301	505,208
M. Wallops Island Field Team-02	1,697,137	167,169	1,864,306
N. AFWTR Field Team-02	486,078	47,879	533,957
P. Langley Research Center Field Team-02	336,985	33,193	370,178
R. Vehicle Failure Investigation-03	0	0	0
S. Emergency Propulsion Sys. Support-01 or -02	0	0	0
T. Customer Responsibility Changes	0	0	0
TOTAL FUNDED ($6,737,100)	$12,266,000	$1,208,200	$13,474,200
Mod. 1 (Incentive Change)	0	0	0
Cork-Base A - Task J	3,969	390	
Deutsch Connectors - Task J	4,075	401	
Switching Relay Mod Kit - Task J	5,723	564	
Delete Magnetic Pick-ups - Task J	(3,482)	(342)	
Training - Task N	5,679	560	
Delete AFWTR Field Team - Task N	(481,694)	(47,447)	
Mod. 2 (Funding $511,604-)	$(465,730)	$(45,874)	$(511,604)
Mod. 3 Funding ($1,904,628)	0	0	0
Rework EGSE and MGSE - Task H			
Mod. 4	7,890	777	8,667
Return Crew to Dallas - Task M			
Mod. 5 Funding ($511,604)	79,086	0	79,086
Mods. to Standard Procedures - Task G	10,134	998	
Mods. to EGSE - Task H	18,249	1,797	
Mod. 6	$28,383	$2,795	$31,178
X-258 Off-site Rep. - Task E	74,681	8,145	
X-258 RMRB - Task E	9,265	124	
Update Spares Inventory - Task L	20,125	1,982	
Mod. 7	$104,071	$10,251	$114,322

TABLE CXLV Continued - SCOUT - NAS1-6020 (CONTRACT HISTORY) LTV AEROSPACE CORPORATION

	FIXED PRICE	TARGET COST	TARGET PROFIT	TARGET PRICE
Call No. 1 - Spares	$ 7,213			
Call No. 2 - Spares	1,930			
Call No. 3 - Spares	6,086			
Call No. 4 - Spares	24,768			
Call No. 6 - Spares	23,257			
Call No. 7 - Spares	35,970			
Call No. 8 - Spares	12,374			
Call No. 10- Spares	2,078			
Mod. 8 - Spares	TASK L			$113,676
Mod. 9 Funding ($4,320,868)		0	0	0
Off-site Quality Rep., FW4S - Task E		$ 26,218	$ 2,582	
Heat Shield Mods. and Fit Checks - Task J		13,400	1,319	
Applic. Cork, Base A Fins - Task K		5,745	565	
Mod. 10		$ 45,363	$ 4,466	$ 49,829
Call No. 5 - Spares	$ 99,396			
Call No. 9 - Spares	29,136			
Call No. 11- Spares	2,337			
Call No. 12- Spares	18,648			
Call No. 13- Spares	42,988			
Call No. 14- Spares	5,814			
Mod. 11 - Spares	TASK L			$198,319
Penalty - Task E (S-152 Failure)		$ 0	$-375,000	
Mod. 12			$-375,000	$ -375,000
Call No. 15 - Failure Invest., S-152 - Task R		$162,000	$15,957	
Call No. 16 - X-259 Tests, S-152 - Task R		77,000	7,585	
Mod. Filters - Task K		24,400	2,400	
Mod. 13		$263,400	$25,942	$289,342
Call No. 17 - Spares	$ 785			
Call No. 19 - Spares	9,717			
Call No. 24 - Spares	11,918			
Call No. 25 - Spares	1,450			
Call No. 26 - Spares	165			
Call No. 27 - Spares	1,287			
Call No. 29 - Spares	3,505			
Call No. 33 - Spares	734			
Mod. 14 - Spares	TASK L			$ 29,561

TABLE CXLV Continued - SCOUT - NAS1-6020 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

FIXED PRICE	TARGET COST	TARGET PROFIT	TARGET PRICE
CCN No. 5 - Change in P/L Assignments - Task J	$ 7,000	$ 690	
Call No. 22 - Tests Base A Sect., S-158C - Task R	1,210	119	
Call No. 32 - Replacement, Veh. Components - Task R	48,700	4,797	
Return Crew to Dallas - Task M	10,998	0	
Off-site Qual. Rep., X-258 - Task E	11,835	1,166	
Audit Subcontractor - Task F	4,898	482	
Adding NAS1-7199 Tool Maintenance - Task H	48,249	4,753	
Mod. 15	$132,890	$ 12,007	$144,897
Call No. 18 - Inspect 5 X-259 Motors - Task S	$ 18,882	$ 1,416	
Call No. 20 - Decontaminate Algol IIB-17 - Task S	534	40	
Call No. 21 - X-258-130 Stat. Fire (Prep.) Task S	17,573	1,338	
Call No. 23 - Igniters - Task S	9,328	681	
Call No. 30 - Change Nozzle on Algol IIB-20 - Task S	881	68	
Call No. 31 - Replace Algol IIB-53 on S-157 - Task S	2,970	190	
Call No. 34 - Rework Algol IIB-55 - Task S	1,988	155	
Call No. 35 - Modify 16 X-259 Nozzles - Task S	5,808	407	
Call No. 38 - Explosive Bolt Shelf Life - Task S	297	21	
Call No. 39 - Repair Castor Drill Jig - Task S	1,368	109	
Mod. 16	$ 59,629	$ 4,425	$ 64,054
CCN-4 - Rev. Scout Stand. Procedures - Task G	$ 10,500	$ 1,034	
Call No. 28 - Test Base A, S-157C - Task R	3,899	384	
Mod. 17	$ 14,399	$ 1,418	$ 15,817
CCN-6 - Base A Fairings, S-160-162 - Task J	$ 1,275	$ 120	
Mod. 18	$ 1,275	$ 120	$ 1,395
Call No. 36 - Prep. for Ship., X-259 Motor - Task S	$ 612	$ 45	
Call No. 37 - Aging Prgm. for X-258 Mtrs./Ign. -Task S	74,861	5,907	
Call No. 41 - Fourth-Stage Initiators - Task S	3,866	257	
Call No. 45 - Batch Test Motors - Task S	3,241	219	
Call No. 47 - Instru., FW-4S Rocket Mtr. - Task S	11,656	1,146	
Call No. 48 - Shelf Life Ext. M-125 Init. - Task S	684	52	
Call No. 49 - Rework Algol IIB-55 Ign. Sleeve - Task S	2,081	166	
Call No. 54 - Removal X-258 Nozzle - Task S	2,061	141	
Call No. 56 - Fab. Aft Insul. Mold, X-259 Mtrs.- Task S	10,558	752	
Call No. 57 - X-ray Castor Rocket Mtr. Noz. - Task S	979	63	
Mod. 19	$110,599	$ 8,748	$119,347

TABLE CXLV Continued - SCOUT - NAS1-6020 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

	FIXED PRICE	TARGET COST	TARGET PROFIT	TARGET PRICE
Call No. 40 - Spares	$ 2,125			
Call No. 42 - Spares	65,025			
Call No. 43 - Spares	6,771			
Call No. 44 - Spares	5,812			
Call No. 46 - Spares	1,767			
Call No. 50 - Spares	4,900			
Call No. 52 - Spares	1,606			
Call No. 53 - Spares	15,987			
Call No. 55 - Spares	4,549			
Call No. 58 - Spares	1,157			
Call No. 59 - Spares	2,305			
Mod. 20 - Spares	TASK L			$ 112,004
Mod. 21 (See Mod. 29) - Task K		$ 0	$ 0	$ 0
Mod. 22 (See Mod. 25) - Task K		$ 0	$ 0	$ 0
Mod. 23 (See Mod. 29) - Task K		$ 0	$ 0	$ 0
CCN-7 - Instrumentation for S-161 - Task K		$17,200	$ 1,700	
Mod. 24				$ 18,900
Mod. 25 (Cancel Mod. 22) - Task K		$ 0	$ 0	$ 0
Mod. 26 (See Mod. 37) - Task B		$ 0	$ 0	$ 0
Penalty - Task E (S-160 Failure)		$ 0	$ -375,000	
Mod. 27				$ -375,000
Call No. 60 - Spares	13,675			
Call No. 62 - Spares	5,302			
Call No. 63 - Spares	3,025			
Call No. 64 - Spares	4,470			
Call No. 65 - Spares	3,820			
Call No. 66 - Spares	8,375			
Call No. 67 - Spares	165			
Call No. 70 - Spares	1,749			
Mod. 28 - Spares	TASK L			$ 40,581
M-21 - Red. 1st & 2nd Stg. Hdcp. Pres.Tub. - Task K		$ 8,375	$ 835	
M-23 - Ext. Shelf Life EX-38 Pres.Cart. - Task K		1,715	175	
Mod. 29		$10,090	$1,010	$ 11,100

TABLE CXLV Continued - SCOUT - NAS1-6020 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

FIXED PRICE		TARGET COST	TARGET PROFIT	TARGET PRICE
Call No. 51 - S-160C Flight Anomaly Invest.-Task R		$674,000	$40,000	
Mod. 30				$ 714,000
Mod 31 - Off-site Quality Rep. at UTC - Task E		$ 6,752	$ 668	$ 7,420
Mod. 32 - Cancel. of Prep. for Ship. X-259 Chamb.-Task S		$ -612	$ -45	-657
Mod. 33 - Termination of 5 Vehicles-Tasks B, C, D, E, F, G, H, J, K, T		$ -769,095	$-60,000	$ -829,095
Mod. 34 - Termination of 5 Vehicles-Tasks B, C, D, E, F, G, H, J		$ 0	$ 0	$ 0
Call No. 61 - Radiography, Algol Nozzle - Task S		$ 2,330	$ 160	
Call No. 69 - Prep. of X-258 Motor for Shipment- Task S		3,137	220	
Call No. 73 - FW-4S Nozzle 30302 Leak Test - Task S		325	21	
Call No. 77 - Inspect. Castor IIA Nozzle Tool - Task S		364	27	
Mod. 35		$ 6,156	$ 428	$ 6,584
Mod. 20 (Revised) Spares	$ -630			
Mod. 28 (Revised) Spares	-888			
Call No. 65A - Spares	1,333			
Call No. 68 - Spares	22,448			
Call. No. 72 - Spares	13,510			
Call No. 74 - Spares	21,804			
Call No. 75 - Spares	459			
Call No. 76 - Spares	4,965			
Mod. 36	TASK L			$ 63,001
Mod. 22 - Dyn. Bal. Upper D Section - Task K		$ 1,500	$ 0	
Mod. 26 - P/L-to-Veh. Compatibility Analysis - Task B		4,700	450	
Mod. 37 - Canceling Mod. 22, Redes. 1st and 2nd Stg. Headcap Pressure Tubing - Tasks B, K		-1,530	0	
Mod. 37		$ 4,670	$ 450	$ 5,120
Mod. 38 - Retransfer Expenses of Personnel from Wallops Station - Task M		$-27,037	$ 0	$ -27,037
Mod. 39 - Incentive Fee, S-160C - Task E		$ 0	$250,000	$ 250,000

TABLE CXLV Concluded - SCOUT - NAS1-6020 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

FIXED PRICE	TARGET COST	TARGET PROFIT	TARGET PRICE
Mod. 40 - Change in Contractor's Division Name	$ 0	$ 0	$ 0
Mod. 41 - Underrun - Task E			
Asset Set Aside	$ 23,881	$ 2,352	
Employee Benefit Plan	97,045	0	
Workmanship Incentive	9,525	0	
Underrun	-486,946	0	
	$-356,495	$ 2,352	$ -354,143
Mod. 42 - Termination Sale Mat'l Credit-Task E	$ -142	0	-142
		TOTAL CONTRACT	$13,489,894
		TOTAL FUNDED	$13,489,722

TABLE CXLVI - FUNDING OF CONTRACT NAS1-6020 SUMMARY

(Includes Modification 41)

FUNDS-FY	PHASE IV	PHASE V	PHASE VI	TOTAL
RAS108-66	$ 79,086.00	$ 0	$ 0	$ 79,086.00
RAS116-64	700.00	0	0	700.00
RAS125-66	395.00	0	0	395.00
RAS125-67	22,107.00	0	0	22,107.00
RAS125-68	612,423.87	92,838.50	0	705,262.37
RAS135-66	1,078,097.24	157,318.73	0	1,235,415.97
RAS140-65	198.00	0	0	198.00
RAS140-66	235,327.05	0	0	235,327.05
RAS140-67	573,499.21	15,810.00	0	589,309.21
RAS140-68	610,127.20	1,502,463.56	53,002.00	2,165,592.76
RAS140-69	127,765.48	26,937.29	0	154,702.77
RAS146-67	6,287.00	29,320.40	0	35,607.40
RAS148-67	290,055.32	0	0	290,055.32
RAS148-68	28,670.85	0	0	28,670.85
RAS149-67	753,286.36	922,579.85	0	1,675,866.21
RAS149-68	156,024.16	209,643.02	0	365,667.18
RAS161-68	102.69	0	0	102.69
RAS163-66	39,972.12	0	0	39,972.12
RAS163-67	0	7,968.25	0	7,968.25
RAS163-68	123,178.53	0	0	123,178.53
RAS164-66	152,928.18	0	0	152,928.18
RAS164-67	121,590.00	18,601.00	0	140,191.00
RAS164-68	1,331,620.63	167,259.41	0	1,498,880.04
RAS173-68	0	1,370.62	0	1,370.62
RAS173-69	150,342.35	-1,370.62	0	148,971.73
RAS174-69	-210.00	44,831.00	0	44,621.00
RAS185-69	0	5,000.00	0	5,000.00
RAS190-69	0	2,700.00	0	2,700.00
RAS190-70	48,337.00	201,663.00	0	250,000.00
RAS191-71	86,000.00	4,416.00	0	90,416.00
RAS200-61	22,434.34	0	0	22,434.34
RAS200-62	116.41	0	0	116.41
RAS204-62	63,490.68	0	0	63,490.68
RAS204-63	55,532.40	0	0	55,532.40
RAS204-64	29,659.54	0	0	29,659.54
RAS204-65	320,896.44	0	0	320,896.44
RAS204-66	360,351.78	0	0	360,351.78
RAS204-67	160,972.64	0	0	160,972.64
RAS211-63	238,658.64	0	0	238,658.64
RAS211-65	211,657.45	0	0	211,657.45
RAS211-66	1,052,333.84	33,686.00	0	1,086,019.84
RAS219-67	1,114,950.10	-364,677.77	99,396.00	849,668.33
RAS219-68	-13,211.00	13,211.00	0	0
TOTAL	$10,245,754.50	$3,091,569.24	$152,398.00	$13,489,721.74
490	$2,545,398.16	$1,891,659.35	$ 53,002.00	$ 4,490,059.51
497-90	4,082,513.08	1,512,690.66	0	5,595,203.74
490-R	3,617,843.26	-317,780.77	99,396.00	3,399,458.49
874	0	5,000.00	0	5,000.00
TOTAL	$10,245,754.50	$3,091,569.24	$152,398.00	$13,489,721.74

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CXLVII - CONTRACT NAS1-6020 OBLIGATIONS

FUNDS	NASA 490	NASA 497	REIMBURSABLES 62-6 and 63-32	REIMBURSABLES *63-29	REIMBURSABLES 66-95	REIMBURSABLES NAVY	REIMBURSABLES AEC	TOTAL
FY 1962								
1967								
January			$ 61,966.68					
1968								
June			31,896.12			$116.41		
August			-30,372.12					
TOTAL FY 1962			$ 63,490.68			$116.41		$ 63,607.09
FY 1963								
1967								
January			$ 55,504.99	$ 254,469.23				
1968								
June				6,137.31			$1,000.00	
October							-1,000.00	
December			27.41	486.44				
1969								
March			15,526.03					
TOTAL FY 1963			$ 71,058.43	$ 261,092.98			$ 0	$ 332,151.41
FY 1964								
1967								
January			$ 29,659.54					
1972								
July			13,754.00					
TOTAL FY 1964			$ 43,413.54					$ 43,413.54
FY 1965								
1967								
January			$ 320,896.44	$ 129,342.07				
March	$ 198.00							
October				12,000.00				
1968								
June				70,315.38				
1971								
April		$ 700.00						
1972								
July				3,182.00				
TOTAL FY 1965	$ 198.00	$ 700.00	$ 320,896.44	$ 214,839.45				$ 536,633.89

---

*Includes $22,434.34 on RAS200.

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CXLII Continued - CONTRACT NAS1-6020 OBLIGATIONS

	NASA		SRT	REIMBURSABLES				TRUST FUND	
FUNDS	490	497		62-6 and 63-32	*63-29	66-95	NAVY	SAN MARCO 984	TOTAL
FY 1966									
1967									
January	$ 204,032.00	$1,279,386.74		$326,716.00	$1,050,760.58				
March		103,111.90		15,026.00					
May		-24,000.00							
June	79,086.00		$ 63,840.22						
November			-63,840.22						
1968									
April		37.51							
June	31,690.05	69,780.22		18,610.78	35,278.68				
July		-0.10							
October				-1.00	-19.42				
December				-1,388.00					
1969									
August				1,388.00					
TOTAL FY 1966	$ 314,808.05	$1,428,316.27	$ 0	$360,351.78	$1,086,019.84				$3,189,495.94
FY 1967									
1967									
January	$ 554,501.39	$1,850,462.26				$ 619,402.08			
February						14,700.00			
March	4,161.00	40,657.10		$148,000.00		1,264,870.00			
April						12,000.00			
May		8,667.00				101,900.00			
June		107,159.78				556,204.00			
July		81,132.00				-2,954.00			
August	22,107.00	51,572.72				800.00			
September	30,529.00	129.15				-2,181.00			
November						-39,000.00			
1968									
March						16,300.00			
April		1,939.92				-7,310.00			
June	117.82	7,968.25		14,360.64		-195,012.32			
July						13,900.00			
August						36,173.12			
October				-1,388.00		-336,526.00			
December				1,388.00		-20,728.29			
1969									
February						-828,514.00			
March						-15,526.03			
April								$ 2,700.00	
June						600.00			
August				-1,388.00					
1971									
June						-600.00			
1972									
September						-142.26			
1973									
June								-2,700.00	
TOTAL FY 1967	$ 611,416.21	$2,149,688.18		$160,972.64		$1,188,255.30		$ 0	$4,110,332.33

---

*Includes $22,434.34 on RAS200.

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CXLII Concluded - CONTRACT NAS1-6020 OBLIGATIONS

	NASA			REIMBURSABLES				TRUST FUND	
FUNDS	490	497	874	62-6 and 63-32	*63-29	66-95	NAVY	SAN MARCO 984	TOTAL
FY 1968									
1967									
August	$2,634,761.00	$1,816,820.28							
September	9,500.00	34,170.85							
October		-375,000.00							
November	19,840.00	99,840.22							
December	2,300.00	14,830.00							
March									
1968									
January	1,000.00	7,500.00							
February	2,550.00	80,110.00							
March	10,500.00	31,367.00				$ 78,500.00			
April	-2,864.00	140,710.57				111,900.00			
May		104,225.00							
June	195,968.13	113,256.53				-100,161.00			
August		3,500.00							
October		-1,500.00							
December		-53,513.85							
1969									
April	-2,700.00								
June	1,370.62								
1971									
April		182.69							
June						-90,239.00			
TOTAL FY 1968	$2,872,225.75	$2,016,499.29				$ 0			$4,888,725.04
FY 1969									
1968									
July	$ 115,050.00	$ 9,000.10							
August		120,000.00							
October	5,608.42	27,961.00							
November	163,661.10	-156,961.10							
1969									
January	36,812.00								
February	57,491.29		$5,000.00						
May	-201.00								
June	-2,629.62								
1970									
February	-27,037.00								
1971									
April	-882.69								
June	423.00								
July	-7,233.24								
October	-180.49								
1972									
July	-30,633.00								
1973									
June	2,700.00								
TOTAL FY 1969	$ 312,948.77	$ 0	$5,000.00						$ 317,948.77
FY 1970									
1970									
February	$ 250,000.00								
1972									
July	-250,000.00								
TOTAL FY 1970	$ 0								$ 0
FY 1971									
1971									
June	$ 90,416.00								
July	7,233.24								
October	180.49								
1972									
July	-90,416.00								
TOTAL FY 1971	$ 7,413.73								$ 7,413.73
TOTAL	$4,119,010.51	$5,595,203.74	$5,000.00	$1,020,183.51	$1,561,952.27	$1,188,255.30	$116.41	$ 0	$13,489,721.74

---

*Includes $22,434.34 on RAS200.

TABLE CXLVIII - FUNDING OF CONTRACT NAS1-6020

(Includes Modification 41)

TASK	PROPORTION	FUNDS-FY	PHASE IV	PHASE V	PHASE VI	TOTAL
A	(13-10)		$1,267,433.27	$414,189.00	$ 0	$1,681,622.27
		(490)				
		RAS200-61	(22,434.34)			
		RAS211-63	(486.44)			
		RAS211-66	(155,489.59)			
		RAS219-67	(467,725.90)			
		(497)				
		RAS135-66	(579,067.00)			
		RAS149-67	(5,572.81)	(414,189.00)		
		RAS164-68	(36,657.19)			
B	(13-5)		$ 149,943.00	$ 52,350.00	$ 0	$ 202,293.00
		(490)				
		RAS140-69	(19.42)	(120.00)		
		RAS200-62	(116.41)			
		RAS204-66	(33,540.00)			
		RAS211-65	(10,986.38)			
		RAS211-66	(36,247.21)			
		(497)				
		RAS135-66	(69,033.58)	(47,230.00)		
		(874)				
		RAS185-69		(5,000.00)		
C	(12-5)		$ 198,226.00	$ 65,291.00	$ 0	$ 263,517.00
		(490)				
		RAS140-68	(5,936.39)			
		RAS174-69		(1,000.00)		
		RAS190-69		(2,700.00)		
		RAS204-65	(44,336.00)			
		RAS211-66	(11,644.00)	(33,686.00)		
		RAS219-67	(50,947.00)	(-33,686.00)		
		(497)				
		RAS135-66		(61,591.00)		
		RAS149-67	(85,362.61)			
D	(13-8)		$ 597,407.51	$ 87,118.49	$ 0	$ 684,526.00
		(490)				
		RAS140-68		(163,623.26)		
		RAS204-64	(977.07)			
		RAS204-66	(115,392.93)			
		RAS211-66	(241,453.51)			
		RAS219-67		(-77,167.51)		
		(497)				
		RAS135-66	(153,696.60)	(662.74)		
		RAS149-67	(85,887.40)			

TABLE CXLVIII Continued - FUNDING OF CONTRACT NAS1-6020

(Includes Modification 41)

TASK	PROPORTION	FUNDS-FY	PHASE IV	PHASE V	PHASE VI	TOTAL
E	(13-10)		$1,881,930.00	$ -9,026.25	$ 0	$1,872,903.75
		(490)				
		RAS174-69		(-180.49)		
		RAS190-71		(180.49)		
		RAS204-65	(276,560.44)			
		RAS204-66	(4,595.56)			
		RAS211-63	(34,926.41)			
		RAS211-65	(81,000.00)			
		RAS211-66	(229,269.87)			
		RAS219-67	(676,728.72)	(-354,113.00)		
		(497)				
		RAS135-66	(243,900.24)	(42,454.99)		
		RAS148-67	(129.15)			
		RAS148-68	(28,670.85)			
		RAS149-67	(295,412.98)	(180,959.35)		
		RAS149-68	(31,253.28)			
		RAS164-68	(-20.517.50)	(121,672.41)		
F	(13-10)		$1,034,027.00	$334,791.50	$ 0	$1,368,818.50
		(490)				
		RAS140-68	(260,197.20)	(116,891.98)		
		RAS204-66	(166,530.00)			
		RAS204-67	(64,765.00)			
		RAS211-65	(108,342.07)			
		RAS211-66	(195,955.45)			
		RAS219-67	(22,237.48)			
		(497)				
		RAS135-66	(32,399.82)	(5,380.00)		
		RAS149-67	(58,329.10)	(2,876.50)		
		RAS149-68	(124,770.88)	(209,643.02)		
G	(13-10)		$ 666,365.00	$210,431.00	$ 0	$ 876,796.00
		(490)				
		RAS125-68	(170,153.26)			
		RAS140-68		(210,431.00)		
		RAS204-62	(31,896.12)			
		RAS204-63	(55,504.99)			
		RAS204-64	(28,682.47)			
		RAS204-66	(18,610.78)			
		RAS204-67	(14,360.64)			
		RAS211-63	(200,431.00)			
		RAS219-67	(10,000.00)			
		(497)				
		RAS149-67	(2,109.07)			
		RAS164-66	(134,616.67)			

TABLE CXLVIII Continued - FUNDING OF CONTRACT NAS1-6020

(Includes Modification 41)

TASK	PROPORTION	FUNDS-FY	PHASE II	PHASE IV	PHASE V	PHASE VI	TOTAL
H	(12-20)		$ 0	$ 155,255.74	$ 106,007.00	$ 53,002.00	$ 314,264.74
		(490)					
		RAS140-68		(141,772.74)	(50,278.71)	(53,002.00)	
		RAS140-69			(48,495.05)		
		RAS190-71			(7,233.24)		
		RAS191-71			(-5,016.00)		
		RAS219-67			(5,016.00)		
		(497)					
		RAS148-67		(8,667.00)			
		RAS164-66		(4,816.00)			
J	(12-0)		$ 0	$1,418,697.12	$ 46,261.90	$ 0	$ 1,464,959.02
		(490)					
		RAS125-66		(395.00)			
		RAS125-68		(95,643.61)	(16,941.50)		
		RAS140-65		(198.00)			
		RAS140-67		(1,686.28)			
		RAS140-69		(12,696.06)			
		RAS204-62		(18,375.56)			
		RAS204-66		(19,696.53)			
		(497)					
		RAS116-64		(700.00)			
		RAS146-67		(6,287.00)	(29,320.40)		
		RAS148-67		(281,259.17)			
		RAS161-68		(102.69)			
		RAS163-68		(80.00)			
		RAS164-68		(981,577.22)			
K	(0-20)		$ 0	$ 228,166.39	$ 188,222.00	$ 0	$ 416,388.39
		(490)					
		RAS140-67		(17,193.72)	(6,310.00)		
		RAS140-68		(88,633.74)	(170,442.00)		
		RAS173-68			(1,370.62)		
		RAS174-69			(10,099.38)		
		RAS204-63		(27.41)			
		RAS204-66		(1,985.98)			
		(497)					
		RAS149-67		(102,339.39)			
		RAS164-68		(17,986.15)			

TABLE CXLVIII Continued - FUNDING OF CONTRACT NAS1-6020

(Includes Modification 41)

TASK	PROPORTION	FUNDS-FY	PHASE II	PHASE IV	PHASE V	PHASE VI	TOTAL
L	(13-10)		$ 0	$ 9,826.57	$ 52,000.00	$ 99,396.00	$ 161,222.57
		(490)					
		RAS219-67		(2,000.00)	(52,000.00)	(99,396.00)	
		(497)					
		RAS164-68		(7,826.57)			
L	(SPARES)		$ 0	$ 451,753.43	$ 202,194.08	$ 0	$ 653,947.51
		(490)					
		RAS125-67		(22,107.00)			
		RAS125-68			(75,897.00)		
		RAS140-67			(9,500.00)		
		RAS140-69			(-1,726.00)		
		RAS174-69			(32,361.00)		
		RAS191-71			(4,416.00)		
		RAS204-62		(13,219.00)			
		RAS204-67		(81,847.00)			
		RAS212-63	(15,526.03)				
		RAS219-67	(-15,526.03)	(183,513.00)	(51,874.00)		
		RAS219-68			(13,211.00)		
		(497)					
		RAS164-66		(4,612.51)			
		RAS164-67		(123,529.92)			
		RAS164-68		(22,925.00)			
M	(2-5)		$ 0	$1,166,846.39	$ 761,106.61	$ 0	$ 1,927,953.00
		(490)					
		RAS108-66		(76,086.00)			
		RAS125-68		(328,627.00)			
		RAS140-66		(204,032.00)			
		RAS140-67		(554,501.39)			
		RAS140-68			(788,143.61)		
		RAS140-69			(-27,037.00)		
		RAS191-71		(600.00)			
N			$ 0	$ 11,055.00	$ 2,510.74	$ 0	$ 13,565.74
		(490)					
		RAS219-67		(4,816.00)	(-142.26)		
		(497)					
		RAS140-68			(2,653.00)		
		RAS149-67		(6,239.00)			

TABLE CXLVIII Concluded - FUNDING OF CONTRACT NAS1-6020

(Includes Modification 41)

TASK	PROPORTION	FUNDS-FY	PHASE II	PHASE IV	PHASE V	PHASE VI	TOTAL
P	(13-10)		$ 0	$ 296,623.00	$ 73,555.00	$ 0	$ 370,178.00
		(490)					
		RAS211-63		(2,814.79)			
		RAS211-66		(182,274.21)			
		(497)					
		RAS149-67		(111,534.00)	(73,555.00)		
R			$ 0	$ 771,913.00	$ 258,968.25	$ 0	$ 1,030,881.25
		(490)					
		RAS140-66		(31,295.05)			
		RAS140-67		(117.82)			
		RAS140-68		(113,587.13)			
		RAS140-69		(84,417.00)			
		RAS173-69		(150,342.35)			
		RAS204-64		(13,754.00)			
		RAS211-65		(14,511.00)			
		RAS219-67		(38,697.00)			
		(497)					
		RAS149-67			(251,000.00)		
		RAS163-66		(39,972.12)			
		RAS163-67			(7,968.25)		
		RAS163-68		(123,098.53)			
		RAS164-66		(4,283.00)			
		RAS164-68		(157,838.00)			
S			$ 0	$ 143,889.00	$ 45,439.00	$ 0	$ 189,328.00
		(490)					
		RAS125-68		(18,000.00)			
		RAS140-69			(-148.00)		
		RAS174-69		(-210.00)			
		RAS219-67		(7,382.00)			
		RAS219-68		(-13,211.00)			
		(497)					
		RAS164-66		(4,600.00)			
		RAS164-68		(127,328.00)	(45,587.00)		
T			$ 0	$ 0	$ -3,443.00	$ 0	$ -3,443.00
		(490)					
		RAS219-67			(-3,443.00)		
TOTAL			$ 0	$10,449,357.42	$2,887,966.32	$152,398.00	$13,489,721.74

TABLE CXLIX - NAS1-6020
(Thousands)

	Hours Budget Hours	Dollars Expended	Total Dollars	Percent Complete
Task A - Administration	78.8/78.8	$ 1,739	$ 1,885	92.2
Task B - Payload	11.1/11.1	180	174	103.4
Task C - Preflight Planning	15.1/15.2	243	237	102.5
Task D - Data Analysis	42.9/42.9	597	621	96.1
Task E - Systems Engineering	109.7/109.6	1,828	1,961	93.2
Task F - Reliability	83.6/83.7	1,223	1,247	98.1
Task G - Standardization	49.9/49.9	697	777	89.7
Task H - Checkout Support	45.5/45.5	516	477	108.2
Task J - Phase IV Checkout	74.1/74.1	938	720	130.3
Task K - Phase V Checkout	54.4/54.4	696	616	113.0
Task L - Logistics	24.6/24.7	258	372	69.4
Task M - WI Field	4.0/4.0	1,481	1,736	85.4
Task N - AFWTR Field	0.8/0.7	70	59	118.6
Task P - LRC Field	0/0	328	337	97.3
Task R - Failure Investigation	31.6/31.6	972	967	100.5
Task S - Emergency Propulsion Sys. Sup.	1.5/1.5	174	180	96.7
Task T - NASA Changes	9.3/9.2	133	140	95.0
Task U - E-Sections	0/0	0	0	0.0
TARGET COST	636.9/636.9	$12,041	$12,506	96.5
TARGET PROFIT		892	468	
TARGET PRICE		$12,933	$12,974	
SPARES (Calls and CCN's)		557	557	
TOTAL CONTRACT		$13,490	$13,531	

TABLE CL - NAS1-6020 PRORATION OF COSTS

TASK	PHASE IV												
PROGRAM	NASA (Total $2,707,492)						NAVY (Total $3,[illegible]2,848)				AIR FORCE ($3,562,991)		
VEHICLE	152	153	155	159	160	161	154	156	157	162	150	151	158
A Negotiated	$	$	$	$ 71,214	$ 71,214	$ 71,214	$	$128,955	$ 255,985	$ 255,985	$	$	$ 640,925
B Negotiated			5,266	15,603	10,532	5,461		975	1,560	3,511			6,826
Mod. 37			138	409	276	143		26	41	92			179
C Negotiated	23,977	1,343	26,132	36,100	21,822	19,936	808	26,402	3,502	4,580		1,617	4,849
D Negotiated (Invest. Transfer to Task R)	32,920	22,171	34,264	37,623	36,280	40,983	41,654	37,623	41,655	37,623	76,590	70,544	43,670
E Negotiated				69,022	69,022	69,022		124,985	248,105	248,105			621,194
Mod. 7										15,369			
Mod. 10				1,066	1,066	1,066		1,930	3,830	3,830			9,590
Mod. 15										2,167			
Mod. 31				275	275	275		497	987	987			2,471
Mod. 42				-5	-5	-5		-10	-19	-19			-47
F Negotiated				49,554	49,554	49,554		89,733	178,126	178,126			445,985
Mod. 15				199	199	199		360	716	716			1,792
G Negotiated				27,932	27,932	27,932		50,580	100,406	100,406			251,392
Mod. 6				412	412	412		746	1,481	1,481			3,707
Mod. 17				427	427	427		773	1,534	1,534			3,841
H,J,K,&T Neg.				90,349	90,349	90,349		163,605	324,769	324,769			813,143
Mod. 2				880	880	880		1,087	1,545	1,546			2,934
Mod. 4				321	321	321		581	1,153	1,153			2,886
Mod. 6				742	742	742		1,343	2,666	2,666			6,675
Mod. 10				778	778	778		1,409	2,797	2,797			7,003
Mod. 13				992	992	992		1,796	3,564	3,564			8,924
Mod. 15				1,961	1,961	1,961		3,551	7,049	14,739			17,650
Mod. 18					465	465				465			
Mod. 24						18,900							
Mod. 29				411	411	411		744	1,476	1,476			3,696
L SPARES Neg.				10,472	10,472	10,472		18,963	37,644	37,644			94,250
Mod. 7	1,381	1,381	1,381	1,381	1,381	1,382	1,382	1,382	1,382	1,382		1,382	1,382
Mod. 8	7,104	7,104	7,104	7,104	7,104	7,104	7,104	7,104	7,104	7,104		7,105	7,105
Mod. 11	12,394	12,395	12,395	12,395	12,395	12,395	12,395	12,395	12,395	12,395		12,395	12,395
Mod. 14	1,847	1,847	1,847	1,847	1,847	1,847	1,847	1,848	1,848	1,848		1,848	1,848
Mod. 20	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000		7,000	7,000
Mod. 28	2,536	2,536	2,536	2,536	2,536	2,536	2,536	2,536	2,536	2,536		2,536	2,527
Mod. 36	3,937	3,937	3,937	3,937	3,937	3,937	3,937	3,938	3,938	3,938		3,938	3,938
M Negotiated		317,024		317,024	317,024								
Mod. 5		15,817		15,817	15,817								
Mod. 15		2,199		2,199	2,200								
Mod. 33		-5,407		-5,407	-5,407								
N Negotiated	39,600		39,600			39,600	49,471	49,471	49,471	49,471		99,002	99,002
Mod. 2	-34,866		-34,867			-34,867	-43,558	-43,558	-43,558	-43,558		-87,168	-87,168
P Negotiated				13,364	13,364	13,364		24,200	48,039	48,039			120,277
R													
Mod. 12 Penalty				-13,875	-13,875	-13,875		-25,125	-49,875	-49,875			-124,875
Mod. 13				9,714	9,714	9,714		17,590	34,918	34,918			87,426
Mod. 15				2,029	2,029	2,029		3,673	7,292	7,292			18,257
Mod. 17				158	158	158		287	570	570			1,426
Mod. 27 Penalty				-13,875	-13,875	-13,875		-25,125	-49,875	-49,875			-124,875
Mod. 30				26,610	26,610	26,610		48,186	95,652	95,652			239,491
Mod. 39 Incentive (Task D Transfer)				9,250	9,250	9,250		16,750	33,250	33,250			83,250
S Negotiated													
Mod. 16				4,862	4,861	802		1,453	10,104	10,095			11,281
Mod. 19				1,346	1,346	1,346		2,437	4,838	18,666			12,114
Mod. 32				-24	-24	-24		-44	-87	-87			-219
Mod. 35				119	119	119		216	429	988			1,075
T. (See H. above)													
TOTAL	$97,830	$389,351	$106,732	$822,248	$801,888	$489,442	$84,576	$763,268	$1,397,943	$1,437,061	$76,590	$120,199	$3,366,202

TABLE CL Concluded - NAS1-6020 PRORATION OF COSTS

TASK	V									VI			VII	BASIC TASKS NEGOTI-ATED	TASK MODI-FICA-TIONS	VEHS. 170-174 TERMI-NA-TION (Mod.33)	FINAL ADJUST-MENT (Mod.41)	FINAL COSTS
	NASA ($3,354,006)								NAVY	NASA	NAVY ($108,231)		NAVY PRODUC-TION SUPPORT*					
	163	164	165	166	167	168	169	175	176	180	182	PRDTN. SUPPORT						
A Negotiated -	$ 71,214	$ 71,214	$ 71,214	$	$ 71,214	$ 71,214	$ 73,137	$	$	$	$	$	$	$2,070,971	$	$-48,028	$-98,244	$ 1,324,699
B Negotiated		13,457	15,603	12,283	36,276	22,234	33,741	4,876	1,365	2,535	2,926			219,743			-24,709	195,034
Mod. 37		353	410	323	952	584	886	128	36	67	77				5,120			5,120
C Negotiated	1,617	29,904	33,676		14,009	17,781	1,347							294,483		-33,686	8,609	269,406
D Negotiated		35,608	48,373		2,016	32,249								834,704		-150,178	-12,680	671,846
Trans. to R																	-46,000	-46,000
E Negotiated	69,022	69,022	69,022		69,022	69,022	70,883							2,044,437		-22,629	-156,360	1,865,448
Mod. 7									15,369			46,107	15,370		92,215			92,215
Mod. 10	1,066	1,066	1,066		1,066	1,066	1,066								28,800			28,800
Mod. 15									2,167			6,501	2,166		13,001			13,001
Mod. 31	275	275	275		275	275	278								7,420			7,420
Mod. 42	-5	-5	-5		-5	-5	-7								-142			-142
F Negotiated	49,554	49,554	49,554		49,554	49,554	50,893							1,356,947		-5,774	-11,878	1,339,295
Mod. 15	199	199	199		199	199	204								5,380			5,380
G Negotiated	27,932	27,932	27,932		27,932	27,932	28,690							876,155		-22,025	-99,200	754,930
Mod. 6	412	412	412		412	412	421								11,132			11,132
Mod. 17	427	427	427		427	427	436								11,534			11,534
H,J,K,&T Neg.	90,349	90,349	90,349		90,349	90,349	92,792							2,503,111		-546,775	485,534	2,441,870
Mod. 2	257	257	257		257	257	261								11,298			11,298
Mod. 4	321	321	321		321	321	326								8,667			8,667
Mod. 6	742	742	742		742	742	760								20,046			20,046
Mod. 10	778	778	778		778	778	799								21,029			21,029
Mod. 13	992	992	992		992	992	1,016								26,800			26,800
Mod. 15	1,961	1,961	1,961		1,961	1,961	2,015								60,692			60,692
Mod. 18															1,395			1,395
Mod. 24															18,900			18,900
Mod. 29	411	411	411		411	411	420								11,100			11,100
L Negotiated	10,472	10,472	10,472		10,472	10,472	10,757							505,208			-222,174	283,034
Mod. 7		1,382	1,382		1,382	1,382									22,107			22,107
Mod. 8		7,105	7,105		7,108	7,108									113,676			113,676
Mod. 11		12,395	12,395		12,395	12,395									198,319			198,319
Mod. 14		1,848	1,848		1,848	1,848									29,561			29,561
Mod. 20		7,001	7,001		7,001	7,001									112,004			112,004
Mod. 28		2,537	2,537		2,537	2,537									40,581			40,581
Mod. 36		3,938	3,938		3,938	3,938									63,001			63,001
M Negotiated		317,025				317,025								1,864,306			-279,184	1,585,122
Mod. 5		15,817				15,818									79,086			79,086
Mod. 15		2,200				2,200									10,998			10,998
Mod. 38		-5,408				-5,408									-27,037			-27,037
N Negotiated			39,602		39,603									533,957			59,937	593,894
Mod. 2			-34,867		-34,867										-522,902			-522,902
P Negotiated	13,364	13,364	13,364		13,364	13,364	13,726							370,178			-8,985	361,193
R Mod. 12	-13,875	-13,875	-13,875		-13,875	-13,875	-14,250								-375,000			-375,000
Mod. 13	9,714	9,714	9,714		9,714	9,714	9,978								262,542			262,542
Mod. 15	2,029	2,029	2,029		2,029	2,029	2,080								54,826			54,826
Mod. 17	158	158	158		158	158	166								4,283			4,283
Mod. 27	-13,875	-13,875	-13,875		-13,875	-13,875	-14,250								-375,000			-375,000
Mod. 30	26,610	26,610	26,610		26,610	26,610	27,330								714,000		5,191	719,191
Mod. 39	9,250	9,250	9,250		9,250	9,250	9,500								250,000			250,000
(D Transfer)																	(46,000)	(46,000)
Mod. 16	802	802	802		802	802	827		3,152			9,455	3,152		64,054			64,054
Mod. 19	1,346	1,346	1,346		1,346	1,346	1,382		13,828			41,486	3,828		119,347			119,347
Mod. 32	-24	-24	-24		-24	-24	-28								-657			-657
Mod. 35	119	119	119		119	119	126		559			1,679	560		6,584			6,584
	$363,614	$807,159	$501,001	$12,610	$456,195	$800,589	$407,734	$5,004	$36,476	$2,602	$3,003	$105,228	$35,076	$13,474,200	$1,198,760	$-829,095	$-354,143	$13,489,722

*X-258 (Navy) Production Support for vehicles 178, 179 and 192 (Phase VI), and vehicle 197 (Phase VII).

TABLE CLI - SCOUT - NAS1-6868 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

	Scope	Fee	Total
Contract (Velocity Package Development	$1,070,000	$88,275	$1,158,275
M-1 (Overhead Rates	$ 0	$ 0	$ 0
M-2 (GFE Regulation Change)	$ 0	$ 0	$ 0
M-3 (Clerical Change)	$ 0	$ 0	$ 0
M-4 (See M-9)	$ 0	$ 0	$ 0
M-5 (GSE Change)	$ 0	$ 0	$ 0
M-6 (See M-8)	$ 0	$ 0	$ 0
M-7 (See M-10)	$ 0	$ 0	$ 0
M-8 (M-6-Ignition System Timers Mods.)	$ 2,540	$ 200	$ 2,740
M-9 (M-4-Backup Signal Conditioners)	$ 1,761	$ 143	$ 1,904
M-10 (M-7-Dyn. Anal. Study Scout with Fifth Stage)	$ 17,200	$ 1,400	$ 18,600
		TOTAL CONTRACT	$1,181,519

TABLE CLII - SCOUT STANDARD FIFTH-STAGE CONTRACT

NAS1-6868
(Thousands)

	Hours Expended/Total	Dollars Expended	Total Dollars	Percent Complete
Task A - Test Program	0.9/0.9	$ 74	$ 74	100.0
Task B - System Integration	2.3/2.3	39	39	100.0
Task C - Standard Fifth-Stage Structure	27.0/14.6	543	543	100.0
Task D - Ground Support Equipment	16.5/2.9	272	270	100.7
Task E - Reliability and Quality Assurance	2.9/0.6	41	41	100.0
Task F - Program Management	7.9/7.0	147	146	100.7
TOTAL	57.5/28.3	$1,116	$1,113	100.3
FEE		87	87	
TOTAL CONTRACT		$1,203	$1,200	

TABLE CLIII - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 1 - Feasibility Study for a 44-inch First-Stage Rocket Motor (1-19-67)	60.400.562	RAS142	$90,200	
M-1 (Administrative Change)			0	
M-2 (Extension Completion Date)			0	
M-3 (Cost Limit)	60.400.562	RAS142	-7,000	
TOTAL				$ 83,200
TASK 2 - Furnishing of Shock Spectrum Plots of Ignition Transients on Scout Vehicles (2-21-67)	60.400.696	RAS149	$ 3,300	
TOTAL				$ 3,300
TASK 3 - Structural Load Tests of a Redesigned FW-4S Rocket Motor Case (3-7-67)	60.400.699	RAS160	$ 3,975	
TOTAL				$ 3,975
TASK 4 - Scout D-Section Separation Systems for Reentries F and G Turbulent Heating Experiment (4-12-67)	62.400.007	RAS140	$159,000	
M-1 (Initiators)			0	
TOTAL				$159,000
TASK 5 - Roll-and-Yaw Compensation Prototype Development (10-23-67) and 2 Flight Units	60.400.721	RAS152	$97,580	
M-1 (Administrative Change)			0	
M-2 (Penalty)			$ -200	
TOTAL				$ 97,380

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 6 - Modification of Five Scout E-Sections (10-11-67)

	60.400.774	RAS140	$ 2,400	
TOTAL				$ 2,400

TASK 7 - Reconfiguration of Test E-Sections (11-13-67)

	60.400.758	RAS140	$ 6,000	
	60.400.786	RAS140	2,013	
TOTAL				$ 8,013

TASK 8 - Feasibility Study of Using the Minuteman First-Stage Rocket Motor on the Scout Vehicle (12-8-67)

	60.400.713	RAS142	$122,300	
M-1 (Minuteman First Stage Study)			0	
M-2 (Schedule Change)			0	
TOTAL				$122,300

TASK 9 - Telemetry Support Station for the Reentry-F Radio Frequency Interference (12-8-67)

	60.400.767	RJF194	$ 2,400	
M-1 (Re-F P/L RFI Test)	60.400.798	RAS125	750	
TOTAL				$ 3,150

TASK 10 - Study, Selection, and Qualification of Scout Telemetry Components (2-19-68)

	60.400.737	RAS168	$118,088	
M-1 (See M-4)			0	
M-2 (See M-4)			0	
M-3 (Hold-down Screw Brackets)	60.400.873	RAS152	6,773	
M-4 (M-1, M-2) Instrumentation Change	60.400.858	RAS173	34,021	
M-5 (Extension of Completion Date)			0	
M-6 (Extension of Completion Date)			0	
M-7 (Extension of Completion Date)			0	
TOTAL				$158,882

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 11 - Four Scout Flight E-Sections, Ten Scout Test E-Sections, and Twelve Spare Timers (3-21-68)

	60.400.752	RAS140	$125,000	
	60.400.808	RAS140	90,144	
M-1 (Drawing Change)			0	
M-2 (See M-4)			0	
M-3 (Mods. E-Section	60.400.846	RAS140	1,000	
Push-off Rings)	60.400.903	RAS140	670	
M-4 (M-2) (Mods. P/L Sep. Timers)	60.400.891	RAS159	33,255	
M-5 (Mods. E-Section)	60.900.004	RAS140	0	
M-6 (Deletion Harness E-Section)	60.400.808	RAS140	-449	
M-7 (M-5) (Mods. E-Sec-	60.400.908	RAS174	1,805	
tion)	60.900.004	RAS140	2,881	
M-8 Contractor's Division Name Change)			0	
M-9 (Final Cost Adjust.)	60.400.891	RAS159	-15,383	
TOTAL				$238,923

Task 12 - Development and Qualification of EX-38 Pressure Cartridge for Scout Heat Shield Separation System (4-5-68)

	60.400.765	RAS163	$ 35,000	
	60.400.814	RAS163	18,687	
M-1 (GFE Revision)			-100	
M-2 (Change in Completion Date)			0	
M-3 (Change in Contractor's Division Name)			0	
M-4 (Extension of Completion Date)			0	
M-5 (Dev. EX-38 Press. Cartridge)	66.000.095	RAS140	13,521	
TOTAL				$ 67,108

Task 13 - Reconfiguration of Lower D-Section to Accommodate the S-Band Telemetry System (5-27-68)

	60.400.737	RAS173	$281,912
	60.400.806	RAS159	129,988
M-1 (See M-4)			0
M-2 (See M-5)			0
M-3 (See M-5)			0
M-4 (M-1) (GSE Change)			0
M-5 (M-2, M-3) (Demonstrate Compat.)	60.400.897	RAS174	75,000
Veh. & GSE Changes	60.400.933	RAS173	13,073

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

Task 13 - Continued

M-6 (Extension of Completion Date)				
M-7	60.900.097	RAS159	4,961	
M-8 (Change in Contractor's Division Name)			0	
M-9 (Extension of Completion Date)			0	
M-10 (Extension of Completion Date)			0	
M-11 (Extension of Completion Date)			0	
TOTAL				$504,934

TASK 14 - Qualification of Apollo Standard Initiator (ASI) in the Modified TX-463 Igniter (8-19-68)

	60.400.792	RAS158	$ 50,000	
	60.400.855	RAS158	17,760	
M-1 (Deletion Evaluator Test)	60.400.855	RAS158	-4,903	
M-2 (GFE Change)			0	
TOTAL				$ 62,857

TASK 15 - Inspection, Documentation, and Testing of Scout Vehicle S-144 (11-4-68)

	60.400.888	RAS140	$ 34,640	
M-1 (Deletion Inspection Electrical Harnesses)	60.400.888	RAS140	-1,582	
TOTAL				$ 33,058

TASK 16 - Modification of Scout Ground Support Equipment (GSE) (12-31-68)

(Roll-Yaw)	60.400.892	RAS173	$ 9,800	
(PCR Box)	60.400.892	RAS173	11,871	
(D-Section)	60.400.892	RAS173	5,500	
M-1 (Mods. to GSE)	60.900.018	RAS173	2,613	
M-2 (Extension of Completion Date)			0	
M-3 (Change in Contractor's Division name)			0	
M-4 (Extension Completion Date)			0	
M-5 (Extension of Completion Date)			0	
M-6 (Extension of Completion Date)			0	
TOTAL				$ 29,784

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 17 - Study and Design of Improved Second-Stage Coast Control System (11-26-68)

	60.400.837	RAS176	$ 50,000	
	60.400.899	RAS176	7,575	
TOTAL				$ 57,575

TASK 18 - Rebuilding Ten (10) Algol IIB Rocket Motor Nozzles (1-7-69)

	60.400.901	RAS159	$348,500	
M-1 (Rebuilding 10 Algol IIB Motors)	60.400.901	RAS173	-31,000	
M-2 (Extension of Completion Date)			0	
M-3 (Extension of Completion Date)			0	
TOTAL				$317,500

TASK 19 - Procurement and/or Manufacture of Additional Hydraulic Test Equipment (1-7-69)

	60.400.889	RAS173	$ 6,750	
M-1 (GFE Revision)			0	
TOTAL				$ 6,750

TASK 20 - Study Program for Development of Improved Material for Solid Propellant Rocket Motor Nozzles (3-11-69)

	60.400.876	RAS179	$ 53,375	
TOTAL				$ 53,375

TASK 21 - Examination of the FW-4S Rocket Motor Nozzle S/N 30210 (3-11-69)

	60.400.910	RAS159	$ 3,380	
TOTAL				$ 3,380

TASK 22 - Shelf Life Extension Study Program for the FW-4S Rocket Motor (3-6-69)

	60.400.878	RAS173	$ 17,257	
TOTAL				$ 17,257

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 23 - Design Review of Scout Rocket Motors (4-30-69)			
60.400.867	RAS182	$ 60,950	
TOTAL			$ 60,950
TASK 24 - Study of Effects of Incorporating a Larger Heat Shield on the Scout Vehicle (4-22-69)			
60.400.894	RAS178	$ 50,000	
60.400.928	RAS178	23,500	
TOTAL			$ 73,500
TASK 25 - Neutron Radiography of Algol IIB Nozzle Insert (3-27-69)			
60.400.861	RAS173	$ 6,000	
60.400.922	RAS173	5,950	
TOTAL			$ 11,950
TASK 26 - Castor IIA Rocket Motor Shelf Life Extension Study Program (3-28-69)			
60.400.925	RAS173	$ 13,100	
TOTAL			$ 13,100
TASK 27 - Castor Rocket Motor Aging Program Testing (5-16-69)			
60.400.930	RAS174	$ 2,680	
TOTAL			$ 2,680
TASK 28 - Preparation and Publication of Scout Rocket Motor Performance Prediction and Analysis Manual (6-9-69)			
60.400.932	RAS142	$ 16,000	
TOTAL			$ 16,000
TASK 29 - FAT Level Vibration Tests on Two (2) San Marco Separation Systems (6-16-69)			
60.400.929	RAS183	$ 9,490	
TOTAL			$ 9,490
TASK 30 - Design Review of Roll and Yaw Compensator Unit (6-17-69)			
60.400.945	RAS152	$ 25,675	
TOTAL			$ 25,675

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 31 - Rework of GFE Initiator Cartridge Assemblies (6-24-69)

	60.400.937	RAS158	$ 4,807	
	60.400.951	RAS158	2,468	
M-1 (Deletion of 10 GFE Initiator Cartridge Assys.)	60.400.951	RAS158	-206	
M-2 (Deletion of 5 GFE Initiator Cartridge Assys.)	60.400.951	RAS158	-82	
M-3 (Extension of Completion Date)			0	
TOTAL				$ 6,987

TASK 32 - Revisions and Additions to Scout Standard Operating Procedures, Volumes II-VI (8-15-69)

	60.900.002	RAS190	$ 42,575	
M-1 (Extension of Completion Date)			0	
M-2 (Deletion Castor IIA Igniter Installation Tool)	60.900.002	RAS190	-711	
TOTAL				$ 41,864

TASK 33 - Refurbishment and Certification of Scout Vehicle 144CR (9-3-69)

	60.900.003	RAS140	$161,175	
M-1 (Diversion of Base A, S-144CR)	60.900.003	RAS140	-5,568	
TOTAL				$ 55,607

TASK 34 - Investigation of Control Surfaces Effectiveness Immersed in a Rocket Exhaust (9-22-69)

	60.400.942	RAS186	$ 98,575	
M-1 (Contractor's Division Name Change)			0	
M-2 (Invest. Cont. Surfaces Effectiveness Immersed in Rocket Exhaust)	66.000.007	RAS186	13,900	
TOTAL				$112,475

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 35 - Modification of Scout Ground Support Equipment to Accommodate Installation of SBASI in Scout Vehicles (11-5-69)

	60.900.014	RAS173	$ 29,500	
M-1 (Mod. of GSE (SBASI))	60.900.107	RAS159	7,257	
TOTAL				$ 36,757

TASK 36 - Redesign, Fabrication, Qualification, and Integration of a Lightweight Separation System for the Scout Vehicle (10-31-69)

	60.400.954	RAS159	$150,120	
TOTAL				$150,120

TASK 37 - Fabrication and Integration of Five G-Sections into the Scout Vehicle System (11-12-69)

	60.900.010	RAS159	$ 28,900	
M-1 (Change in Completion Date)			0	
TOTAL				$ 28,900

TASK 38 - FW-4S Rocket Motor Shelf Life Extension Program (11-17-69)

	60.900.026	RAS173	$ 84,000	
TOTAL				$ 84,000

TASK 39 - Examination of the Postfired Condition of an FW-4S Rocket Motor (12-10-69)

	60.900.038	RAS190	$ 2,900	
TOTAL				$ 2,900

TASK 40 - Design, Fabrication, Qualification, and Delivery of Composite Material Nozzles for Algol IIB Rocket Motors (1-22-70)

	60.900.048	RAS159	$500,000	
	60.900.061	RAS159	117,000	
M-1 (Change in Subcontractor)			0	
M-2 (Change in Contractor's Division Name)			0	
M-3 (Change in Delivery Schedule)			0	
M-4 (Reduction in Proof Pressure Requirements)	60.900.061	RAS159	-350	
TOTAL				$616,650

TABLE CLIII Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 41 - Design, Development, Qualification, and Fabrication of a Larger Heat Shield for the Scout vehicle (2-18-70)

	60.900.007 60.900.051	RAS301 RAS173	$200,000 476,080	
M-1 (Administrative Change)			0	
M-2 (Five Heat Shields, -40 Inch)	60.900.082 60.900.117	RAS183 RAS184	300,000 33,286	
M-3 (See M-4)			0	
M-4 ((M3) Part. Del. Wind Tunnel Test Data; Add'l.GFE)	60.900.140 60.900.144	RAS190 RAS190	50,000 11,420	
M-5 (See M-7)			0	
M-6 (Contractor's Division Name Change)			0	
M-7 ((M5) Add Door, 42-inch H/S)	66.000.024	RAS173	3,254	
M-8 (Change in Delivery Schedule)			0	
M-9 (Large Heat Shield)	66.000.057	RAS173	37,150	
TOTAL				$1,111,190

Task 42 - Testing of Modified Scout Jet Vanes (2-18-70)

	60.900.050	RAS186	$ 74,250	
M-1 (See M-2)			0	
M-2 ((M-1) Jet Vane Test)	60.900.179	RAS173	34,234	
M-3 (Contractor's Name Change)			0	
M-4 (See M-5)			0	
M-5 ((M-4) Testing Modified Jet Vanes)	(66.000.067	RAS173	74,620	
M-6 (Testing Modified Jet Vanes)	66.000.127	RAS173	25,331	
TOTAL				$ 208,435

Task 43 - Shelf Life Extension Program for X-258E6, X-259B3, and BE3-A9 Rocket Motors (2-27-70)

	60.900.054	RAS159	$ 75,239	
M-1 (Government Furnished Property Change)			0	
M-2 (Change in Test Schedule)			0	
M-3 (Change in Contractor's Division Name)			0	
M-4 (Change in Contract Schedules)			0	
TOTAL				$ 75,239

TABLE CL III Continued - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 44 - Development of Fourth-Stage S-Band Instrumentation (5-15-70)

	60.900.039	RAS159	$ 98,687	
	60.900.039	RAS195	107,495	
M-1 (See M-3)			0	
M-2 (See M-3)			0	
M-3 ((M-1,2) Inc. Ign.	60.900.112	RAS159	50,000	
Sys.;4-stg. Instr.)	66.000.010	RAS159	8,674	
M-4 (4th-stg. Acceler. Change)	60.900.187	RAS173	47,964	
M-5 (Change in Contractor's Division Name)			0	
M-6 (Extension of Completion Date)			0	
M-7 (Overrun)	66.000.116	RAS159	40,055	
M-8 (Extension Completion Date)			0	
TOTAL				$ 352,875

TASK 45 - Modification of Test E-Section, Ser. No. 31 (3-16-70)

	60.900.045	RAS173	$ 4,000	
	60.900.049	RAS173	4,000	
	60.900.074	RAS159	7,400	
M-1 (Extension of Completion Date)			0	
TOTAL				$ 15,400

TASK 46 - Furnishing of Algol III Rocket Motor Handling/Storage Dollies (5-18-70)

	60.900.042	RAS190	$ 95,000	
	60.900.099	RAS190	34,132	
TOTAL				$ 129,132

TASK 47 - Preparation of Scout Standard Handling Procedures Manual for the Naval Ammunition Depot (4-28-70)

	60.900.056	RAS192	$ 8,000	
	60.900.091	RAS192	5,600	
TOTAL				$ 13,600

TASK 48 - Furnishing of Scout E-Section Marman Clamp and UK-4 Bumper Ring (6-10-70)

	60.900.071	RAS190	$ 11,430	
TOTAL				$ 11,430

TABLE CLIII Concluded - SCOUT - NAS1-6935 (TASK CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK 49 - Scout Separation Systems Test Planning Guide Manual (6-18-70)

	60.900.070	RAS190	$ 6,000	
	60.900.095	RAS190	4,490	
TOTAL				$ 10,490

TASK 50 - Fourth-Stage Spin Bearing Tests (6-15-70)

	60.900.077	RAS159	$ 6,260	
M-1 (Extension of Completion Date)			0	
TOTAL				$ 6,260

TASK 51 - UK-4 Payload Test Support and E-Section Test Rework (8-24-70)

	60.900.094	RAS190	$ 8,490	
M-1 (Contractor's Division Name Change)			0	
M-2 (See M-3)			0	
M-3 ((M-2) Engineer to England, UK-4)			2,119	
M-4 (Overrun)	66.000.117	RAS196	1,600	
	66.000.123	RAS196	1,798	
TOTAL				$ 14,007
		TOTAL CONTRACT		$5,431,764

TABLE CLIV - CONTRACT NAS1-6935 OBLIGATIONS

FUNDS	NASA		SRT	REIMBURSABLES	TASK	TOTAL
	490	497	180	66-95		
FY 1966						
1967						
February			$ 90,200.00		1	
December			-7.000.00		1	
1968						
January			70,840.22		8	
July			232.04		14	
TOTAL FY 1966			$154,272.26			$ 154,272.26
FY 1967						
1967						
March	$159,000.00	$ 3,300.00			4,2	
1968						
January			$ 51,459.78		8	
February			50,000.00		10	
March			68,088.00		10	
July			50,468.00		14	
October			4,374.42		10	
1970						
May				$ 98,687.00	44	
October				266,997.00	13	
TOTAL FY 1967	$159,000.00	$ 3,300.00	$224,390.20	$365,684.00		$ 752,374.20
FY 1968						
1967						
November	$ 2,400.00		$ 97,580.00		6,5	
1968						
January	8,013.00				7	
February	600.00				9	
April	60,000.00	$155,144.00			11	
May	150.00	53,687.00			9,12	
June	950.00	411,900.00			11,13	
July			17,059.96		14	
October			2,398.58		10	
December		-411,900.00	57,575.00		13,17	
1969						
April			18,000.00		20	
May			111.54		24	
June			-52,685.00		28	
September	2.75	-100.00			33,12	
October			-4,903.00		14	
1971						
August				$ 59,637.00	43	
TOTAL FY 1968	$ 72,115.75	$208,731.00	$135,137.08	$ 59,637.00		$ 475,620.83
FY 1969						
1968						
November	$ 76,000.00				10,11	
December	446,540.00				13,15	
1969						
January	449,412.00				10,11,13,16	
February	24,007.00				19,22	
March	54,205.00				11,13,23	
April	28,430.00		$ 35,375.00		20,21,25,26	
May	-82,460.00		134,338.46		18,23,24,29	
June	60,255.00		36,585.00		17,25,27,28,30	
July			7,275.00		31	
August		$200,000.00*			41	
September	14,273.00				13,33	
November	2,613.00				16	
1970						
February			-206.00		31	
March			31,918.00		31,42	
June	-1,582.00				15	
October	-266,997.00		-157,834.75		13,20,23,24	
1971						
January	-57,575.00				17	
August	-15,383.00				11	
TOTAL FY 1969	$731,738.00	$200,000.00	$ 87,450.71			$1,019,188.71

TABLE CLIV Concluded - CONTRACT NAS1-6935 OBLIGATIONS

	NASA		SRT	REIMBURSABLES	TASK	TOTAL
FUNDS	490	497	180	66-95		
FY 1970						
1969						
July	$ 3,546.00				11	
September	202,547.25				32,33	
October	-449.00				11	
November	263,620.00		$ 98,575.00		34,35,36,38	
December	30,040.00				11,37	
1970						
January	2,900.00				39	
February	1,093,080.00				40,41	
March	69,671.00		42,250.00		33,40,42,43	
April	15,400.00				45	
May	249,516.00				32,44,46,47	
June	49,160.00				44,48	
July	16,750.00				49,50	
October			157,834.75		13,20,23,24	
November	4,961.00				13	
December	12,270.00				44	
1971						
January	61,420.00		57,575.00		17,41	
April			13,900.00		34	
August	-59,637.00				43	
December	40,055.00				44	
1972						
February	-350.00				40	
TOTAL FY 1970	$2,054,500.25		$370,134.75			$2,424,635.00
FY 1971						
1970						
July	$ 333,286.00				41	
August	73,500.00				41	
September	15,747.00				35,51	
October	37,579.00				42	
December	8,674.00				44	
1971						
January	-25,281.00				41,42,44	
April	1,754.00				41,51	
May	92,000.00				42	
August	19.00				51	
November	-17,380.00				42	
TOTAL FY 1971	$ 519,898.00					$ 519,898.00
FY 1972						
1971						
July	$ 37,150.00				41	
October	13,521.00				12	
December	3,398.00				51	
1972						
February	25,331.00				42	
TOTAL FY 1972	$ 79,400.00					$ 79,400.00
TOTAL	$3,616,652.00	$412,031.00	$971,385.00	$425,321.00		$5,425,389.00
In Process						$ 6,375.00
						$5,431,764.00

*Subauthorization, Ames; 711

C-5

TABLE CLV - SCOUT - NAS1-6969 (CONTRACT HISTORY)
TRW INCORPORATED

CONTRACT	SCOPE	FEE	TOTAL
	$183,883	$14,817	$198,700
M-1	3,670	-2,500	1,170
		TOTAL CONTRACT	$199,870

TABLE CLVI - SCOUT - NAS1-7102 (CONTRACT HISTORY)
HERCULES INCORPORATED

Amendment	Item		Cost
Contract	Casting Powder (GFE)		$371,000
	1 BE3A9 Mockup	$11,300	
	1 BE3A9 Inert Motor	37,000	
	2 BE3 AEDC Test Motors	74,000	
	1 Balance Fixture	5,000	
	16 Spare Detonators	3,200	
	Documentation	18,500	
	6 BE3A9 Motors	222,000	
	1 Scout		
	2 Scout		
	3 Scout		
	4 Scout		
	5 Scout		
	6 Scout		
M-1	(CCN 1, 2, 3) Design Improvements & Additional Tests		$101,875
M-2	Change in Government Furnished Property Clause		$ 0
M-3	BE-3-A1 Ignitor Mods. (CCN-1)		$ 54,200
M-4	Schedule Change		$ 0
M-5	Mods. to Test Fixtures, BE-3A-9 Test Program		$ 1,450
		TOTAL CONTRACT	$528,525

TABLE CLVII - SCOUT - NAS1-7256 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK	TARGET COST	TARGET PROFIT	TARGET PRICE
A. Program Management	$ 1,844,113	$126,909	$ 1,971,022
B. Payload Coordination	157,601	10,846	168,447
C. Preflight Planning	188,044	12,941	200,985
D. Data Reduction and Analysis	485,933	33,441	519,374
E. Systems Engineering	1,389,088	95,594	1,484,682
F. Reliability Program	1,273,269	87,624	1,360,893
G. Standardization & Configuration Control	823,039	56,640	879,679
H. Support to Vehicle Processing	202,637	13,945	216,582
# J. Vehicle Processing (Phases IV.a.(S-144RR) and V Vehicles)	1,136,035	78,180	1,214,215
K. Vehicle Processing (Phase VI Vehicles)	398,000	27,390	425,390
L. Logistics Support Management	429,547	29,561	459,108
M. Logistics Support Materials	500,000	0	500,000
N. Wallops Island Support	1,046,917	72,047	1,118,964
P. Langley Support	288,298	19,840	308,138
R. Failure Investigation	0	0	0
S. Emergency Support	0	0	0
T. Vehicle Processing Hardware	363,330	25,004	388,334
V. Tooling and GSE Maintenance	454,545	31,280	485,825
W. Certification Training	31,968	2,200	34,168
X. Training Film	22,636	1,558	24,194
TOTAL FUNDED ($4,710,000)	$11,035,000*	$725,000	$11,760,000
Mod. 1 S-166 D Section - Task J	$ 7,950	$ 750	$ 8,700
Mod. 2 Instrumented E-Section (See Mod. 6) - Task J	$ 0	$ 0	$ 0
Mod. 3 Install Cork to Base A Fins -Task K	$ 2,750	$ 260	$ 3,010
Call No. 1 - Shipping Material, S-163	$ 532		
Call No. 2 - Dwgs. and Specs. Emerg. Sup.	5,600		
Call No. 3 - Initiators and E - Sect.	76,512		
Call No. 4 - San Marco Protective Barriers	4,797		
Mod. 4 (Funded)	Task S**		$ 87,441
Mod. 5 Funding ($3,190,000)			
Mod. 6 Instrumented E Section (Mod. 2) - Task J	$ 68,000	$ 6,600	$ 74,600

---

*Includes 500K cost reimbursable Task M.

**Fixed Price.

#Processed - 166P1, 170P2, 171P3, 172, 173, 174, 175, 176, 177, 178, 163, 179P3, 144P2, 180P1

TABLE CLVII Continued - SCOUT - NAS1-7256 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK		TARGET COST	TARGET PROFIT	TARGET PRICE
Mod. 7	Roll and Yaw Compensation S-176 - Task J	$44,000	$4,280	$ 48,280
Mod. 8	Incorp. Instrumentation for SBASI Flight Evaluation - Task J	$17,396	$1,675	$ 19,071
Mod. 9	Ignition Mods - Tasks J, K	$14,700	$1,400	$ 16,100
Mod. 10	D Section Mods - Task K	$28,900	$2,800	$ 31,700
Mod. 11	Spec. Change, S-144 - Task J	$ 0	$ 0	$ 0
Mod. 12	Heat Shield Mods - Task T	$ 6,975	$ 675	$ 7,650
Mod. 13	Statement of Work Change - Task J	$ 0	$ 0	$ 0
Call No. 5	- Retest S-169 Guidance Sys.	$ 8,858		
Call No. 6	- Mod. S-166 D Sect, P.L.Chng.	7,819		
Call No. 7	- Qual.Scout 4th-Stg.Lmt.Res.Box	6,524		
Call No. 8	- Elect.Eval.Tst.Scout Ign.Sep.Cir.	7,178		
Call No. 9	- Inspect.Castor II Rkt.Mtr.@ WTR	2,396		
Call No. 10	- Inspect.Castor II at WI	2,024		
Mod. 14	(Funded)	Task S**		$ 34,799
Mod. 15	Spec.Chg.to Inc.Proc.S-163CR - Task K	0	$ 0	$ 0
Mod. 16	Retrans.Exp.for WI Pers. from NAS1-6020 to NAS1-7256 - Task N	$27,037(Funded)	$ 0	$ 27,037
Mod. 17	Quality Rep. at UTC - Task F	$19,033	$ 1,665	$ 20,698
Mod. 18	Funding ($4,089,809)			
Mod. 19	E-Sect. Instrumentation (M-11,M-13)- Task J	$49,850	$ 4,800	$ 54,650

**Fixed Price.

TABLE CLVII Continued - SCOUT - NAS1-7256 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK	TARGET COST	TARGET PROFIT	TARGET PRICE
Call No. 12 - Fab. Scout Test Cables	$ 4,081		
Call No. 13 - Mods. S-166 and S-177 for GRP-A P/L Anten. Mount	1,519		
Call No. 15 - 10 Scout Base A Jet Vanes	19,600		
Call No. 17 - Inspect. Castor II Rckt. Mtr.	1,914		
Call No. 18 - Rework Scout Heat Shields	2,195		
Call No. 19 - X-258, X-259 Ign. Shelf-Life Vr.	10,195		
Mod. 20	Task S**		$ 39,504
Mod. 21 VAFB Launch Services 7-1-70 to 11-1-70 - Task N	$140,070	$11,556	$ 151,626
Mod. 22 Tooling and GSE Maint. - Task V	$ 41,692**		$ 41,692
Call No. 8 - Eval. Tests Scout Ign. System Circuits	$ -2,268		
Mod. 23	Task S		$ -2,268
Mod. 24 - Rev. Vol. III-Rocket Motor Manual (SOP) (See Mod. 30) - Task G	$ 0**		$ 0
Mod. 25 - Extension of Completion Date-Tasks C, D, F, G, K, M, T	$ 0	$ 0	$ 0
Mod. 26 - Tooling and GSE Maint. - Task V	$ 1,778		$ 1,778
Call No. 11 - Interim Pyrotechnics and GSE Requirements	$ 45,216		
Call No. 16 - Flight Instrumentation	33,500		
Call No. 21 - Services for BE3-A9 Motor	2,834		
Call No. 23 - Assign/Reassign X-259 Nozzles	203		
Call No. 24 - Heat Shield Neg.Press.Tests	12,534		
Call No. 25 - X-258 Igniter Shelf-Life Prog.	39,838		
Call No. 26 - Inspection S/N-55 Algol IIB Mot.	17,148		
Call No. 27 - T/M Signal Conditioning Unit, Roll & Yaw Comp. System	26,627		
Call No. 28 - Extension Castor II Shelf-Life Program	75,065		
Call No. 29 - Inspect. Castor IIA Motor, S/N-184, at VAFB	2,427		
Call No. 30 - Algol III Test Components	1,607		
Call No. 32 - Crating Castor II Noz., 620-017	480		
Mod. 27	Task S**		$ 257,479

**Fixed Price.

TABLE CLVII Continued - SCOUT - NAS1-7256 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK	TARGET COST	TARGET PROFIT	TARGET PRICE
Mod. 28 - Mods. to Ignition Systems on Vehs. S-144, S-177, S-163, and S-175, and Incorp. GFE on Vehs. S-178 through S-181 - Task J	$ 2,700	$135	$ 2,835
Mod. 29 - Tech. at VAFB Sept. and Oct. 1970 - Task N	$ 4,558	$450	$ 5,008
Mod. 30 - Reconstructure SOP, Vol. III (Mod. 24) - Task G	$ 24,896	$2,427	$ 27,323
Mod. 31 - Contractor's Division Name Change			0
Mod. 32 - Change in Sched. of Mo. Bill. Prices			0
Call No. 14 - Inspection T/M Package and Transmitter	$ 2,172		
Call No. 20 - X-258 Igniter Shelf Life Verification Program	$ 10,312		
Call No. 22 - Algol IIB Motor Closure Assy.	$ 6,307		
Call No. 31 - Proc. 13 E-Sections	$ 93,340		
Call No. 33 - Fab. SOLRAD-C P/L Protective Shield	$ 2,448		
Call No. 34 - Prep. Transition Section D for 42-inch Static Load Test	$ 2,684		
Call No. 35 - Inspection Castor IIA Motor Nozzle Tool	$ 396		
Call No. 36 - Long Lead Time Components, S-144	$ 6,388		
Call No. 37 - S-144 Special Instrumentation	$ 17,554		
Call No. 38 - Reproduction of Documents	$ 408		
Mod. 20 Credit - Two X-258 igniters	$ -1,400		
Mod. 33	Task S**		$ 140,609
Mod. 34 - Incentive Award			$ 425,000
Mod. 35 - Credit - Decrease in Scope			$ -589,669
Mod. 36 - Extension of Completion Date			$ 0

**Fixed Price.

TABLE CLVII Concluded - SCOUT - NAS1-7256 (CONTRACT HISTORY)
LTV AEROSPACE CORPORATION

TASK		TARGET PRICE
Mod. 37 - Final Price Redetermination		
Task M - Spares Actual $492,163	$-7,837	
Task N - Retransfer of Personnel $8,153	$-18,884	
Task S - Emergency Support $557,564	0	
Target Cost Adjustment $10,591,277 Overrun	$176,210	
Target Profit Adjustment 25% ($176,210)	$-44,053	
Task V - Tooling & GSE Maintenance (F.P.) $43,470	0	
		$ 105,436
TOTAL CONTRACT		$12,800,089

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CLVIII - CONTRACT NAS1-7256 OBLIGATIONS

FUNDS	NASA 180	NASA 490	NASA 497	ESRO 894	REIMBURSABLES 63-29	REIMBURSABLES 66-95	REIMBURSABLES NAVY	TOTAL
FY 1963								
1970								
March					$ 11,529.25			
TOTAL FY 1963					$ 11,529.25			$ 11,529.25
FY 1965								
1970								
March					$ 750.00			
TOTAL FY 1965					$ 750.00			$ 750.00
FY 1967								
1970								
March						$977,189.34		
June						-294,187.00		
July						100,000.00		
October						242,553.26		
November						5,008.00		
1972								
July						-2,428.54		
TOTAL 1967						$1,028,135.06		$1,028,135.06
FY 1968								
1968								
December			$2,189,936.88					
1970								
May			5,895.83					
October		$ 2.74				$ 142,191.74		
1971								
August						99,000.00		
1972								
May						13,747.00		
September						209.00		
TOTAL FY 1968		$ 2.74	$2,195,832.71			$ 255,147.74		$ 2,450,983.19
FY 1969								
1968								
December		$2,520,063.12						
1969								
March		5,310.00						
May		6,450.00						
1970								
March					$210,531.41			
August		-860.28						
October		267,029.50						
1972								
July		-24,441.10						
TOTAL FY 1969		$2,773,551.24			$210,531.41			$ 2,984,082.65

TABLE CLVIII Concluded - CONTRACT NAS1-7256 OBLIGATIONS

FUNDS	NASA			ESRO	REIMBURSABLES			TOTAL
	180	490	497	894	63-29	66-95	NAVY	
FY 1970								
1969								
July		$ 75,681.00						
August		3,190,000.00						
September		17,146.00						
October		9,550.00						
November		28,900.00						
December		8,315.00						
1970								
January		55,940.00						
March		1,744,509.00		$1,200,000.00				
April		7,600.00						
May		-5,895.83						
June	$371,676.28	128,786.72						
July	-25,000.00	-81,461.00						
August		-1,407.72						
October	-346,676.28	-139,413.96						
November		457,085.00		-454,250.00				
1971								
June		-99,874.85		99,874.85				
August		-80,000.00						
1972								
January		-147,067.00						
July		-68,555.07						
September		-209.00		92,996.58				
TOTAL FY 1970	$ 0	$5,099,628.29		$ 938,621.43				$ 6,038,249.72
FY 1971								
1970								
July		$ 64,692.00						
September		221,265.00						
October		-55,495.00						
November		5,025.00						
December		4,323.00						
1971								
June		425,000.00						
August		-32,566.00					$ 2,600.00	
1972								
January		-442,602.00						
May		-13,747.00						
July				2,428.13				
TOTAL FY 1971		$ 175,895.00		$ 2,428.13			$ 2,600.00	$ 180,923.13
TOTAL	$ 0	$8,049,077.27	$2,195,832.71	$941,049.56	$222,810.66	$1,283,282.80	$ 2,600.00	$12,694,653.00

TABLE CLIX - FUNDING OF CONTRACT NAS1-7256

(Includes Mod. 37 and CCN 38)

TASK	PROPORTION	FUNDS-FY	PHASE V	PHASE VI	PHASE VII	TOTAL
A	(10-4)		$1,948,575.32			$1,948,575.32
		(490)				
		RAS-190-0	(871,180.61)			
		RAS219-7	(124,000.00)			
		RAS300-0	(169,562.00)			
		(497)				
		RAS164-8	(783,832.71)			
B	(11-6)	(490)	$ 185,533.90			$ 185,533.90
		RAS140-0	(141,710.90)			
		RAS219-7	(20,000.00)			
		RAS300-0	(23,823.00)			
C	(10-3)	(490)	$ 149,243.29			$ 149,243.29
		RAS140-0	(66,985.00)			
		RAS159-0	(27,226.29)			
		RAS219-7	(34,000.00)			
		RAS300-0	(21,032.00)			
D	(11-1)	(490)	$ 97,068.54			$ 97,068.54
		RAS140-0	(157,326.93)			
		RAS159-1	(-230,672.00)			
		RAS190-1	(-104,192.00)			
		RAS219-7	(228,760.46)			
		RAS300-0	(43,417.02)			
		RAS300-1	(2,428.13)			
E	(10-4)		$1,554,447.43			$1,554,447.43
		(490)				
		RAS140-9	(20,000.00)			
		RAS140-0	(-40,890.83)			
		RAS173-0	(33,487.00)			
		RAS190-1	(5,082.00)			
		RAS219-7	(3,467.26)			
		RAS300-0	(144,302.00)			
		(497)				
		RAS164-8	(1,389,000.00)			

TABLE CLIX Continued - FUNDING OF CONTRACT NAS1-7256

(Includes Mod. 37 and CCN 38)

TASK	PROPORTION	FUNDS-FY	PHASE V	PHASE VI	PHASE VII	TOTAL
F	(10-4)	(490)	$1,216,346.38			$1,216,346.38
		RAS140-0	(74,818.68)			
		RAS140-8	(2,74)			
		RAS140-9	(267,029.50)			
		RAS159-0	(209,647.44)			
		RAS178-0	(371,676.28)			
		RAS219-7	(117,058.00)			
		RAS219-8	(75,726.74)			
		RAS300-0	(100,387.00)			
G	(10-4)	(490)	$ 626,924.19			$ 626,924.19
		RAS140-0	(460,444.78)			
		RAS159-0	(42,998.00)			
		RAS190-1	(25,138.00)			
		RAS211-9	(47,531.41)			
		RAS300-0	(50,812.00)			
H	(10-4)	(490)	$ 358,744.10			$ 358,744.10
		RAS140-0	(18,107.59)			
		RAS159-9	(202,000.00)			
		RAS173-0	(31,700.00)			
		RAS219-7	(77,080.00)			
		RAS300-0	(29,856.51)			
J	(10-0)	(490)	$1,955,131.04	$ 2,835.00		$1,957,966.04
		RAS140-0	(627,430.14)			
		RAS159-9	(736,000.00)			
		RAS159-0	(224,000.00)	(2,835.00)		
		RAS190-0	(54,650.00)			
		RAS211-9	(163,000.00)			
		RAS300-0	(150,050.90)			
K	(0-4)	(490)		$249,977.00		$ 249,977.00
		RAS159-9		(397,139.72)		
		RAS159-9		(-39,424.72)		
		RAS159-1		(-107,738.00)		
L	(10-4)	(490)	$ 354,093.89			$ 354,093.89
		RAS159-0	(308,653.64)			
		RAS211-3	(11,529.25)			
		RAS211-5	(750.00)			
		RAS300-0	(33,161.00)			

TABLE CLIX Continued - FUNDING OF CONTRACT NAS1-7256

(Includes Mod. 37 and CCN 38)

TASK	PROPORTION	FUNDS-FY	PHASE V	PHASE VI	PHASE VII	TOTAL
M	(10-4)	(490)	$ 388,369.90	$ 92,163.00		$ 480,532.90
		RAS159-9	(355,558.90)	(100,000.00)		
		RAS195-3		(-7,837.00)		
		RAS300-0	(32,811.00)			
N		(490)	$1,323,304.00	$18,884.00		$1,304,420.00
		RAS190-0	(100,000.00)			
		RAS191-9	(400,000.00)			
		RAS191-0	(657,409.00)			
		RAS192-0	(37,907.00)			
		RAS195-3		(-18,884.00)		
		RAS219-7	(79,569.00)			
		RAS300-0	(48,419.00)			
P	(10-4)	(490)	$ 304,591.85			$ 304,591.85
		RAS190-0	(278,240.85)			
		RAS300-0	(26,351.00)			
R	(0-0)					
S	(0-0)	(490)	$ 350,241.00	$205,716.00	$ 1,607.00	$ 557,564.00
		RAS174-9	(11,760.00)			
		RAS174-0	(164,434.00)			
		RAS190-0	(22,364.00)		(-543.00)	
		RAS190-1	(29,420.00)	(62,248.00)		
		RAS195-0	(53,197.00)	(1,627.00)		
		RAS195-1	(-13,743.00)	(42,629.00)	(2,150.00)	
		RAS219-8	(80,209.00)	(99,212.00)		
		RAS222-1	(2,600.00)			
T	(10-4)	(490)	$ 437,369.12			$ 437,369.12
		RAS140-0	(8,713.00)			
		RAS159-9	(284,063.12)			
		RAS159-0	(66,000.00)			
		RAS219-7	(47,200.00)			
		RAS300-0	(31,393.00)			
V	(10-4)	(490)	$ 392,551.91	$ 14,283.00		$ 406,824.91
		RAS159-0	(68,135.57)			
		RAS159-1		(14,283.00)		
		RAS190-1	(26,290.00)			
		RAS219-7	(267,000.34)			
		RAS300-0	(31,126.00)			

TABLE CLIX Concluded - FUNDING OF CONTRACT NAS1-7256

(Includes Mod. 37 and CCN 38)

TASK	PROPORTION	FUNDS-FY	PHASE V	PHASE VI	PHASE VII	TOTAL
W	(10-4)	(490)	$ 29,699.14	$132,157.00		$ 161,856.14
		RAS140-0	(-2,418.86)			
		RAS219-7	(30,000.00)			
		RAS300-0	(2,118.00)			
X	(1-0)	(497)	$ 23,000.00			$ 23,000.00
		RAS164-8	(23,000.00)			
Target Cost Adjustment Overrun		RAS195-0		(176,210.00)		
Target Profit Adjustment		RAS195-0		(-44,053.00)		
TOTAL			$11,695,235.00	$678,247.00	$ 1,607.00	$12,375,089.00
INCENTIVE FEE						425,000.00
						$12,800,089.00
		(180)	$ 371,676.28	$ 0	$ 0	$ 371,676.28
		(490)	7,202,194.99	579,035.00	1,607.00	7,782,836.99
		(497)	2,195,832.71	0	0	2,195,832.71
		(490-R)	1,409,481.46	99,212.00	0	1,508,693.46
		(490-T)	941,049.56	0	0	941,049.56
TOTAL			$12,120,235.00	$678,247.00	$ 1,607.00	$12,800,089.00

TABLE CLX - SCOUT SYSTEMS MANAGEMENT CONTRACT

NAS1-7256 (Thousands)

	Hours Budget Hours	Dollars Expended	Total Dollars	Percent Complete
Task A - Program Management	78.8/74.9	$ 1,994	$ 1,930	103.3
Task B - Payload Coordination	9.7/9.5	204	159	128.3
Task C - Preflight Planning	10.3/10.3	180	189	95.2
Task D - Data Reduction and Analysis	15.9/30.7	262	491	53.4
Task E - Systems Engineering	96.2/90.2	1,699	1,385	122.7
Task F - Reliability	54.5/68.3	1,184	1,294	91.5
Task G - Standardization & Configuration Control	34.9/46.6	598	759	78.8
Task H - Support to Vehicle Processing	15.0/13.0	245	202	121.3
Task J - NAS1-5610	77.5/94.3	1,086	1,330	81.7
Task K - NAS1-7199 Vehicle Processing	21.7/31.3	336	428	78.6
Task L - Logistics Management Support (Includes Spares Repair)	28.0/28.4	390	458	85.1
Task M - Spares	0/12.0	366	527	69.4
Task N - Wallops Island Support	2.9/6.2	1,282	1,164	110.1
Task P - Langley Program	0/0	309	288	107.3
Task R - Failure Investigation	0/0	0	0	0
Task S - Emergency Support	0/0	305	417	73.1
Task T - Vehicle Hardware	27.7/26.3	366	368	99.5
Task V - Tooling and GSE Maintenance	31.4/34.6	398	511	77.8
Task W - Certification Training	1.0/1.6	25	32	78.1
Task X - Documentary Films	0/0	23	23	100.0
TARGET COST PLUS FIXED PRICE	505.5/578.1	$11,252	$11,955	94.1
TARGET PROFIT		682	764	
TOTAL CONTRACT		$11,934	$12,719	

TABLE CLXI - NAS1-7256 PRORATION OF COSTS

TASK	PHASE	IV	V													
	PROGRAM	NASA	NASA (Total $7,634,314)										NAVY($1,969,058)			ESRO
	VEHICLE	144	163	166	167	169	171	173	174	175	177	SUPPORT	170	176	SUPPORT	172
A		$ 84,782	$169,563	$169,563		$	$ 169,563	$169,563	$169,563	$169,563	$169,563		$169,563	$ 169,563		$ 169,562
B		23,822	4,332			19,492	12,995		4,332	8,663		$ 82,299		2,166		23,823
C			1,338	1,147		3,441	38,239	41,871	38,239	18.163	17,207		1,722	5,736		21,032
D					$53,896	55,840	44,450							54,174		69,453
E		72,150	144,301	144,301			144,301	144,301	144,301	144,301	144,302		144,302	144,302		144,302
F		49,365	98,731	98,731			98,731	98,732	98,732	98,732	98,732		98,732	98,732		98,732
Mod. 17		827	1,656	1,656			1,656	1,656	1,656	1,656	1.656		1,656	1,656		1,655
G		24,313	48,626	48,626			48,626	48,626	48,626	48,626	48,626		48,626	48,627		48,627
Mod. 30		1,092	2,186	2,186			2,186	2,186	2,186	2.186	2,186		21,86	2,186		2,185
H,J,K		83,399	127,855	94,798			113,683	96,153	114,084	112,282	143,460		115,655	165,534		161,159
Mod. 1				8,700												
Mod. 3																
Mod. 6		6,781	6,781	6,782			6,782	6,782	6,782	6,782	6,782		6,782	6,782		6,782
Mod. 7														48,280		
Mod. 8												12,260			$ 6,811	
Mod. 9		1,150	1,150	1,150			1,150	1,150	1,150	1,150	1,150		1,150	1,150		1,150
Mod. 10																
Mod. 19		54,650														
Mod. 28		405	405							405	405					
L		16,580	33,160	33,160			33,160	33,160	33,160	33,160	33,160		33,161	33,161		33,161
M		32,810	32,810	32,811		32,811	32,811	32,811	32,811	32,811	32,811		32,811	32,811		32,811
N						594,572	594,572									
Mod. 16						13,518	13,519									
Mod. 21						37,907								75,813		37,906
Mod. 29						1,252								2,504		1,252
P		13,175	26,350	26,350			26,350	26,350	26,350	26.350	26,350		26,351	26,351		26,351
R																
S																
Mod. 4			532									86,909				
Mod. 14				7,819		8,858						18,122				
Mod. 20				759							760	30,340			7,645	
Mod. 23												-2,268				
Mod. 27												149,041			103,997	
Mod. 33		23,942									2,448*	105,307			8,912	
T		15,390	30,780	30,780			30,780	30,781	30,781	30,781	30,781		30,781	30,781		30,781
Mod. 12		306	612	612			612	612	612	612	612		612	612		612
V		28,224	28,224	28,224		28,224	28,224	28,224	28,224	28,224	28,224		28,224	28,224		28,228
Mod. 22		2,780	2,780	2,780		2,780	2,780	2,780	2,780	2,779	2,779		2,779	2,779		2,779
Mod. 26		119	119	119		119	119	119	119	119	118		118	118		118
W		1,059	2,117	2,118			2,118	2,118	2,118	2,118	2,118		2,118	2,118		2,118
X		988	1,976	1,976			1,976	1,976	1,976	1,976	1,977		1,977	1,977		1,977
Inc. (Mod.34)						106,250	106,250							106,250		106,250
TOTAL		$538,109	$766,384	$745,148	$53,896	$905,064	$1,555,633	$769,951	$788,582	$771.439	$796,207	$482,010	$749,306	$1,092,387	$127,365	$1,052,801

*Special NRL Fund.

TABLE CLXI Concluded - NAS1-7256 PRORATION OF COSTS

VI							VII	BASIC TASKS NEGOTIATED	TASK MODIFICATIONS	SCOPE CHANGE (MOD. 35)	FINAL ADJUSTMENT	FINAL COSTS	TASK
NASA ($242,367)				NAVY($1,353,170)		ESRO	NASA SUPPORT						
180	181	183	191	178	179	185							
				$169,562	$169,563			$1,971,022			$ 148,514	$2,119,536	A
$ 6,497	$ 6,497	$12,995				$8,663		168,447		$ 9,357	38,772	216,576	B
				3,059				200,985		-35,406	25,615	191,194	C
								519,374		-427,570	186,009	277,813	D
				144,302	144,301			1,484,682			319,085	1,803,767	E
				98,732	98,713			1,360,893			-126,748	1,234,145	F
				1,656	1,656				$ 20,698			20,698	Mod. 17
				48,627	48,626			879,679			-271,851	607,828	G
				2,186	2,186				27,323			27,323	Mod. 30
8,626				148,281	55,455			1,856,187		-136,050	-179,713	1,540,424	H,J,K
									8,700			8,700	Mod. 1
1,003				1,003	1,004				3,010			3,010	Mod. 3
									74,600			74,600	Mod. 6
									48,280			48,280	Mod. 7
									19,071			19,071	Mod. 8
1,150				1,150	1,150				16,100			16,100	Mod. 9
10,567				10,567	10,566				31,700			31,700	Mod. 10
									54,650			54,650	Mod. 19
405				405	405				2,835			2,835	Mod. 28
				33,161	33,160			459,108			-44,604	414,504	L
32,811	32,811	32,811						500,000			-7,837	492,163	M
								1,118,964			70,180	1,189,144	N
									27,037			27,037	Mod. 16
									151,626			151,626	Mod. 21
									5,008			5,008	Mod. 29
				26,351	26,350			308,138			21,241	329,379	P
													R
													S
									87,441			87,441	Mod. 4
									34,799			34,799	Mod. 14
									39,504			39,504	Mod. 20
									-2,268			-2,268	Mod. 23
			$2,834				$1,607		257,479			257,479	Mod. 27
									140,609			140,609	Mod. 33
				30,781	30,781			388,334			-3,575	384,759	T
				612	612				7,650			7,650	Mod. 12
28,223	28,223	28,223						485,825			- 62,469	423,356	V
2,779	2,779	2,779							41,692			41,692	Mod. 22
118	118	118							1,778			1,778	Mod. 26
				2,118	2,118			34,168			-7,694	26,474	W
				1,977	1,976			24,194			511	24,705	X
									425,000			425,000	Inc.(Mod.34)
$92,179	$70,428	$76,926	$2,834	$724,530	$628,640	$8,663	$1,607	$11,760,000	$1,524,322	$-589,669	$105,436	$12,800,089	TOTAL

SECTION VI - STATISTICAL DATA

PRECEDING PAGE BLANK NOT FILMED

The statistical data concerning Scout Phases IV and V that have been included in this section are as follows:

1. EXPENDITURES

   (a) DOD Plant Services
   (b) LaRC Support
   (c) Travel
   (d) Shipping
   (e) Total Scout Program
   (f) Spares
   (g) Wallops and WTR G.S.E. and
   (h) 42-inch Heat Shield and Motor Shelf Life Programs

2. MANAGEMENT

   (a) Manpower
   (b) Launch Record
   (c) Program Numbers
   (d) Delivery Dates, Launch Dates, and Operational Inventory
   (e) Program Review

3. TECHNICAL INFORMATION

   (a) General Technical Description
   (b) Nominal Weight Summary
   (c) Heat Shields
   (d) Vehicle Improvements
   (e) Summary of Boost Trajectory Performance
   (f) Motors
   (g) First-Stage Moment Disturbances
   (h) Second- and Third-Stage Thrust Misalinement and Moment Disturbances
   (i) Second- and Third-Stage Fuel Consumption Reaction Control System
   (j) Second- and Third-Stage Initial Conditions and Capture
   (k) Vehicle Flight Loads Summary
   (l) Spin Table Joint Stiffness Data Summary
   (m) Dynamic Response Data Summary
   (n) Average Temperature Changes or Trends in Thermal Measurements
   (o) Control System and Limit Cycle Parameters
   (p) Fourth-Stage Spinup Summary
   (q) Thermal Environment Summary
   (r) Conditions at Fourth-Stage Burnout
   (s) First-Stage Pitch Program, Maximum Control Surface Deflections and Roll Transients
   (t) Orbital Parameters
   (u) Ignition System
   (v) Payload Mounting and Separation

I. EXPENDITURES

1. EXPENDITURES

(a) The Department of Defense provided audit and quality services for the Scout Program at all the Contractor's Plants. The costs of these services were reimbursed by NASA. Through 1968 Langley Research Center paid for these costs as billed by D.O.D. From 1968 through 1971 D.O.D. billed NASA for audit and quality services for all NASA programs and NASA Headquarters billed each program a prorated share based on a percentage of their budget. The majority of the services were provided in Dallas, Texas, by NAVPRO. Table CLXII itemizes all costs for the Scout Program. Table CLXII also lists the Headquarters assessment starting in 1968. Tables CLXIII through CLXV provide the data as to the type of funds used to pay for these services. The Scout contracts that were audited by D.O.D. were listed in LWP-804 and table CXXVII in Section V of this publication. The LTV contract history is shown in figure 33.

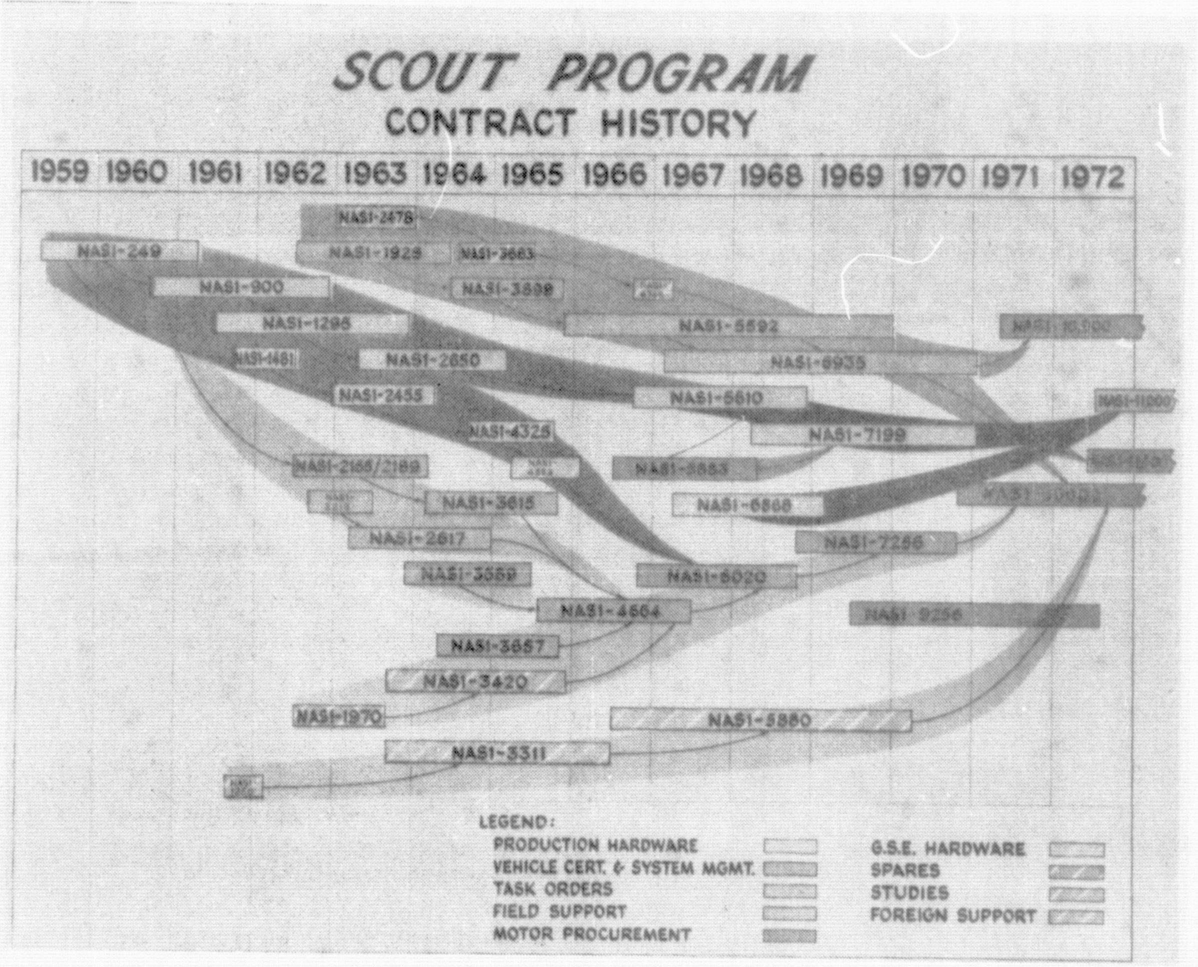


Figure 33.- LTV Contract History.

TABLE CLXII - DOD PLANT SERVICES (DCASO)

	1965 & Prior	1966	1967	1968	1969	1970	1971	TOTAL
AEC	$ 4,776.02	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,776.02
AIR FORCE								
RAS204	58,827.96	1,480.00	52,044.78	0	0	0	0	112,352.74
RAS205	134.00	89.60	0	0	0	0	0	223.60
RAS212	737.70	0	0	0	0	0	0	737.70
RAS214	0	4,006.10	537.00	0	0	0	0	4,543.10
RAS216	0	915.90	0	0	0	0	0	915.90
NAVY								
RAS200	0	0	16,204.00	0	0	0	0	16,204.00
RAS211	154,769.96	25,134.40	5,474.00	0	0	0	0	185,378.36
RAS219	0	28,090.99	89,368.30	59,313.00	54,500.00	59,000.00	56,000.00	346,272.29
NASA								
Development	0	25.43	0	0	0	0	0	25.43
Production	208,988.64	199,396.45	6,434.52	37,696.00	54,500.00	59,000.00	56,000.00	622,015.61
SEAM	85,403.64	134,408.56	67,509.61	27,627.20	0	0	0	314,949.01
San Marco	2,301.23	5,497.55	1,040.00	0	0	0	0	8,838.78
SRT	0	118.96	54.00	0	0	0	0	172.96
Delta	0	17.22	3,218.00	0	0	0	0	3,235.22
TOTAL*	$515,939.15	$399,181.16	$241,884.21	$124,636.20	$109,000.00	$118,000.00	$112,000.00	$1,620,940.72

---

*NASA-OA funds - Prior to 1965.
Accurate charges 1964-1967.
Estimated by Headquarters 1968 and Sub.

TABLE CLXIII - STATUS OF DOD PLANT SERVICES
(AUDIT AND FIELD)

NASA-SEAM (497)

J.O.	OBLIGATIONS
FY 1964 (L-24995) 45.110.011	
RAS116	*
FY 1965 (L-40992) 45.110.018	45.110.020
RAS116 (EAB841)	$ 3,744.00
NAS1-2455	($3,744.00)
RAS124 (EAB841)	$ 33,412.85
NAS1-1928	($2,311.95)
NAS1-2165	(224.00)
NAS1-2455	(2,104.00)
NAS1-2617	(41.80)
NAS1-2650	(8,280.00)
NAS1-2698	(180.80)
NAS1-3420	(344.00)
NAS1-3589	(11,869.60)
NAS1-3615	(1,432.00)
NAS1-3657	(626.94)
NAS1-3833	(320.00)
NAS1-3899	(306.56)
NAS1-4325	(5,238.00)
NAS1-4664	(133.20)
RAS126 (EAB841)	$ 244.00
NAS1-3615	($244.00)
RAS127 (EAB841)	$ 278.00
NAS1-4325	($278.00)
RAS135 (EAB841)	$ 25,541.22
NAS1-1928	($1,212.66)
NAS1-1928	(6.80)
NAS1-2215	(80.00)
NAS1-3589	(10,700.22)
NAS1-3657	(7,535.78)
RAS135 (EAB841) Continued	
NAS1-3899	($78.05)
NAS1-3899	(3,264.00)
NAS1-4325	(1,805.28)
NAS1-4664	(794.41)
NAS1-4795	(23.22)
NAS5-6	(40.80)
RAS136 (EAB841)	$ 13,592.58
NAS1-2455	($209.98)
NAS1-3589	(4,952.00)
NAS1-3615	(8,110.45)
NAS1-4664	(320.15)
RAS137 (EAB841)	$ 5,059.54
NAS1-2617	($90.56)
NAS1-4325	(4,968.98)
RAS138 (EAB841)	$ 3,224.94
NAS1-1928	($786.50)
NAS1-3899	(2,438.44)
RAS146 (EAB841)	$ 139.32
NAS1-3615	($104.49)
NAS1-2455	(34.83)
RAS147 (EAB841)	$ 69.66
NAS1-4325	($69.66)
RAS149 (EAB841)	$ 97.53
NAS1-1928	($97.53)
FY 1965 TOTAL	$ 85,403.64

---

*With Headquarter's Funds.

TABLE CLXIII Concluded - STATUS OF DOD PLANT SERVICES
(AUDIT AND FIELD)

NASA-SEAM (497) Continued

J.O.	OBLIGATIONS
FY 1966 (L-61800) 01.030.020	
RAS124 (EAB840)	$ 443.00
NAS1-3657(229)	($443.00)
RAS135 (EAB840)	$ 72,322.36
NAS1-1481(269)	($320.00)
NAS1-1928(219,267)	(2,370.00)
NAS1-2215(278)	(160.00)
NAS1-2455(279)	(120.00)
NAS1-3589(68,69)	(20,273.43)
NAS1-3657(229,272)	(13,645.00)
NAS1-3899(157,158)	(23,077.87)
NAS1-4325(71,156)	(2,572.00)
NAS1-4794(177)	(625.60)
NAS1-4795(176)	(9,127.84)
NAS5-61(215)	(30.62)
RAS136 (EAB840)	$ 360.00
NAS1-2455(279)	($200.00)
NAS1-3615(274)	(160.00)
RAS138 (EAB840)	$ 2,720.00
NAS1-3683(230)	($1,744.00)
NAS1-5592(280,281)	(976.00)
RAS149 (EAB840)	$ 251.60
NAS1-6076(487)	($251.60)
FY 1966 TOTAL	$ 76,096.96
FY 1967 (L-85050) 45.110.051	
RAS135 (EAB847)	$ 1,104.00
NAS1-3657(111)	($160.00)
NAS1-3899(106,107)	(784.00)
NAS1-4325(109)	(160.00)

J.O.	OBLIGATIONS
RAS137 (EAB847)	$ 6,075.00
NAS1-4795(222)	($5,915.00)
NAS1-1481(101)	(160.00)
RAS138 (EAB847)	$ 1,200.00
NAS1-5592(97)	($1,200.00)
RAS146 (EAB847)	$ 56.00
NAS1-4325(108)	($56.00)
RAS148 (EAB847)	$ 76,040.00
NAS1-4664(85)	($66,980.00)
NAS1-5592(96)	(9,060.00)
RAS149 (EAB847)	$ 1,969.20
NAS1-1928(103)	($480.00)
NAS1-4794(220)	(665.20)
NAS1-6935(621)	(824.00)
RAS157 (EAB847)	$ 136.00
NAS1-7102(732)	($136.00)
FY 1967 TOTAL	$ 86,580.20
FY 1968 DIRECT OSS	$ 36,000.00
SEAM TOTAL	$284,080.80

- -

NASA-DEVELOPMENT (890)

J.O.	OBLIGATIONS
FY 1966 (L-61800) 01.030.020	
RAS100 (EAB840)	$ 25.43
NAS1-553(487)	$ ($25.43)
FY 1966 TOTAL	$ 25.43
NASA-890 TOTAL	$ 25.43

TABLE CLXIV - STATUS OF DOD PLANT SERVICES (AUDIT AND FIELD)

NASA-PRODUCTIONS (490)

J.O.	PHASE	OBLIGATIONS
FY 1964 (L-24995) 45.110.011		
RAS104		
NAS1-2650	III	*
FY 1965 (L-40992) 45.110.018 & .020 (60%)		
RAS104(EAB841)		$ 880.91
NAS1-1928	III	($13.93)
NAS1-2650	III	(860.18)
NAS1-900	II	(6.80)
RAS108 (EAB841)		$ 6,521.92
NAS1-1295	III	($174.15)
NAS1-1928	III	(16.00)
NAS1-2650	III	(103.97)
NAS1-3420	III	(445.66)
NAS1-3589	III	(4,612.00)
NAS1-3615	III	(1,170.14)
RAS115 (EAB841)		$ 72,217.25
NAS1-1295	III	(4,616.43)
NAS1-1970	III	(112.00)
NAS1-1928	III	(1,771.00)
NAS1-2165	III	(160.05)
NAS1-2189	III	(136.00)
NAS1-2650	III	(32,067.06)
NAS1-3420	III	(1,096.21)
NAS1-3493	III	(170.31)
NAS1-3589	III	(8,086.02)
NAS1-3615	III	(3,397.10)
NAS1-3657	III	(19,088.00)
NAS1-3833	III	(1,275.27)
NAS1-3899	III	(241.80)
RAS118(EAB841)		$ 2,745.29
L-67666	III	(217.60)
NAS1-585	III	(285.60)
NAS1-1330	III	(984.00)
NAS1-1928	III	(20.90)
NAS1-2165	III	(112.00)
NAS1-2650	III	(30.29)
NAS1-3833	III	(1,074.00)
NAS1-3899	III	(20.90)
RAS125 (EAB841)		$126,623.27
NAS1-1925	IV	($7,259.26
NAS1-1330	IV	(481.20)
NAS1-2165	IV	(489.60)
NAS1-2650	IV	(13,452.20)
NAS1-3420	IV	(6,693.84)
NAS1-3493	IV	(1,579.00)
NAS1-3589	IV	(28,047.16)
NAS1-3657	IV	(24,855.72)
NAS1-3664	IV	(76.50)
NAS1-3698	IV	(33,032.79)
NAS1-3833	IV	(10,656.00)
FY 1965 TOTAL		$208,988.64
FY 1966 (L-61800) 01.030.020 (50%)		
RAS108 (EAB840)		$ 160.00
NAS1-2189(277)	IV	($160.00)
RAS118 (EAB840)		$ 120.00
NAS1-1970(276)	IV	($120.00)
RAS125 (EAB840)		$199,116.45
NAS1-585	IV	($911.20)
NAS1-900(275)	IV	(979.60)
NAS1-1295(271)	IV	(975.50)
NAS1-1970(276)	IV	(120.00)
NAS1-2165(273)(403)	IV	(237.25)
NAS1-2189(277)	IV	(160.00)
NAS1-2650(223)	IV	(1,237.75)
NAS1-3420(41)(88)	IV	(4,681.54)
NAS1-3493(168)(191)	IV	(11,349.28)
NAS1-3589(86)(87)	III	(40.00)
NAS1-3615(42)	III	(5,421.58)
NAS1-3664(170)	IV	(384.00)
NAS1-3698(171)(190)	IV	(32,466.76)
NAS1-3833(172)(328)	IV	(9,123.65)
NAS1-3899(40)	III	(375.00)
NAS1-4664(127)	IV	(100,000.00)
NAS1-5034(175)	IV	(29,053.34)
NAS1-5610(390)	IV	(1,600.00)
FY 1966 TOTAL		$199,396.45

---

*With Headquarter's funds.

TABLE CLXIV Continued - STATUS OF DOD PLANT SERVICES (AUDIT AND FIELD)

NASA-PRODUCTIONS (490) Continued

J.O.	PHASE	OBLIGATIONS
FY 1967 (L-85050) 45.110.051 (48%)		
RAS108 (EAB847)		$ 160.00
NAS1-3615(393)	IV	(160.00)
RAS125 (EAB847)		$ 3,151.72
NAS1-1330(198)	III	(0.40)
NAS1-5883(453)(461)	IV	(3,055.32)
NAS1-6444(663)	IV	(96.00)
RAS140 (EAB847)		$ 3,122.80
NAS1-4664(84)	IV	(1,328.00)
NAS1-4794(219)	IV	(182.80)
NAS1-4795(221)	IV	(384.00)
NAS1-5610(563)	V	(1,228.00)
FY 1967 TOTAL		$ 6,434.52
FY 1968 45.110.051		
NAS1-5610 (563)		696.00
DIRECT OSS		
FY 1968	V	$ 37,000.00
FY 1969	V	109.000.00
FY 1970	V	118,000.00
FY 1971	V	112,000.00
NASA 490 TOTAL		$791,515.60

AIR FORCE (490)

J.O.	PHASE	OBLIGATIONS
FY 1964 (L-24995) 45.110.011		
RAS204		$ 33,168.20
NAS1-1295	III	(22,342.57)
NAS1-2650	III	(10,825.63)
FY 1965 (L-40992) 45.110.018 (17%)		
RAS204 (EAB841)		$ 25,659.76
NAS1-1295	III	(350.07)
NAS1-1928	III	(1,793.35)
RAS204 (EAB841) Continued		
NAS1-2165	III	(27.86)
NAS1-2617	III	(20.90)
NAS1-2650	III	(1,247.57)
NAS1-3420	III	(27.86)
NAS1-3589	III	(3,498.18)
NAS1-3657	III	(16,799.80)
NAS1-3698	III	(103.20)
NAS1-3899	III	(1,391.24)
RAS212 (EAB841)		$ 737.70
NAS1-1295	III	(238.00)
NAS1-2165	III	(47.60)
NAS1-2650	III	(387.60)
NAS1-3493	III	(64.50)
RAS205 (EAB841)		$ 134.00
NAS1-1026		(134.00)
FY 1965 TOTAL		$ 26,531.46
FY 1966 (L-61800) 01.030.020 & .022 (23%)		
RAS204 (EAB842)		$ 1,480.00
NAS1-2650(223)	IV	(480.00)
NAS1-3899(158)	IV	(1,000.00)
RAS205 (EAB842)		$ 89.60
NAS1-1026(164)(165) JR.		(89.60)
RAS214 (EAB842)		$ 4,006.10
NAS1-3698(171)(190)	IV	(4,006.10)
RAS216 (EAB842)		$ 915.90
NAS1-3698(190)	IV	(915.90)
FY 1966 TOTAL		$ 9,176.20

TABLE CLXIV Concluded - STATUS OF DOD PLANT SERVICES (AUDIT AND FIELD)

AIR FORCE (490) Continued

J.O.	PHASE	OBLIGATIONS
FY 1967 (L-85050) 01.030.050 (13%)		
RAS204 (EAB848)		$ 52,044.78
NAS1-2650(540)	IV	(208.00)
NAS1-3420(391)(392)	IV	(432.00)
NAS1-3493(204)(205)	IV	(1,475.00)
NAS1-3589(98)(99)	IV	(1,172.00)
NAS1-3664(208)	III	(384.00)
NAS1-4664(84)(85)	IV	(23,024.00)
NAS1-5883(453)	IV	(23,149.56)
NAS1-6020(579)	IV	(112.00)
NAS5-61(560)	II	(56.22)
NAS1-5034(223)	IV	(2,032.00)
RAS214 (EAB848)		$ 536.00
NAS1-3698(210)	IV	(536.00)
FY 1967 TOTAL		$ 52,580.78
AIR FORCE TOTAL		$121,456.64

NAVY (490)

J.O.	PHASE	OBLIGATIONS
FY 1964 (L-24995) 45.110.011		
RAS211		$ 51,089.44
NAS1-1295	III	(26,285.37)
NAS1-2650	III	(12,736.04)
NAS1-3420	III	(12,068.03)
FY 1965 (L-40992) 45.110.018 (20%)		
RAS211 (EAB841)		$103,680.52
NAS1-1295	III	(891.57)
NAS1-1330	III	(1,121.05)
NAS1-2165	III	(2,079.65)
NAS1-2650	III	(17,679.92)
NAS1-3420	III	(5,531.64)
NAS1-3589	III	(8,581.13)
NAS1-3833	III	(58,785.28)
NAS1-3899	III	(576.00)
NAS1-3493	IV	(8,434.28)
FY 1966 (L-61800) 01.030.020 & .022 (27%)		
RAS211 (EAB842)		$ 25,134.40
NAS1-4664(126,127)	IV	(25,134.40)
RAS219 (EAB842)		$ 28,090.99
NAS1-4664(127)		(28,090.99)
FY 1966 TOTAL		$ 53,225.39
FY 1967 (L-85050) 01.030.050 (39%)		
RAS200 (EAB848)		$ 16,204.00
NAS1-1330(198)	III	(204.00)
NAS1-4664(84)	IV	(16,000.00)
RAS211 (EAB848)		$ 5,474.00
NAS1-1295(283)(284)	III	(320.00)
NAS1-4664(84,85)	IV	(1,528.00)
NAS1-5034(223)	IV	(682.00)
NAS1-5610(563)	IV	(16.00)
NAS1-5883(453)	IV	(2,928.00)
RAS219 (EAB848)		$ 89,368.30
NAS1-3833(212)(213)	IV	(250.80)
NAS1-5034(223)(224)	IV	(246.00)
*NAS1-5610(564)	V	(39,759.50)
NAS1-6020(580)	IV	(49,112.00)
FY 1967 TOTAL		$111,046.30
NAVY TOTAL		$319,041.65

---

*631.90 listed as EAB-847.

TABLE CLXV - STATUS OF DOD PLANT SERVICES (AUDIT AND FIELD)

J.O.	PHASE	OBLIGATIONS
NASA-SAN MARCO (894)		
FY 1964 (L-24955) 45.110.011		
RAS110		$ 975.53
NAS1-2475	I	(975.53)
FY 1965 (L-40992) 45.110.018		
RAS110 (EAB841)		$ 1,325.70
NAS1-2475	I	(237.70)
NAS1-3311	II	(1,064.00)
NAS1-4899	III	(24.00)
FY 1966 (L-61800) 01.030.020		
RAS110 (EAB840)		$ 5,497.55
NAS1-3311(227)(268)	III	(1,024.00)
NAS1-4899(12)(262)	II	(4,473.55)
FY 1967 (L-85050) 45.110.051		
RAS150 (EAB847)		$ 1,040.00
NAS1-5880(469)(470)	III	(712.00)
NAS1-3311(104)(105)	III	(168.00)
NAS1-3899(107)	IV	(160.00)
SAN MARCO TOTAL		$ 8,838.78
AEC (490)		
FY 1964 (L-24995) 45.110.011 (3%)		
RAS209		$ 4,776.02
NAS1-3420	III	(4,776.02)
Complete		

J.O.	PROGRAM	OBLIGATIONS
SRT (180)		
FY 1966 (L-61800) 01.030.020		
RAS134 (EAB840)		$ 51.00
NAS1-3589(230)	09-07	(51.00)
RDK233 (EAB840)		$ 67.96
NAS1-5191(173)	32-08	(67.96)
FY 1967 (L-85050) 45.110.051		
RAS151 (EAB847)		$ 192.00
NAS1-6969(618)(619)	32-06	(192.00)
RAS154 (EAB847)		$ -138.00
NAS1-6748(566)(567)	59-04	(-138.00)
SRT TOTAL		$ 172.96
DELTA MOTORS (492)		
FY 1966 (L-61800) 01.030.020		
RAS117 (EAB840)		$ 17.22
NAS1-3698(170)		(17.22)
FY 1967 (L-85050) 45.110.051		
RAS117 (EAB847)		$ 3,218.00
NAS1-3664(209)		(32.00)
NAS1-3698(211)		(3,186.00)
FY 1967 TOTAL		$ 3,218.00
DELTA MOTORS TOTAL		$ 3,235.22

(b) The Scout Project Office kept account of the labor costs associated with each type of sub-program. The hours and costs for these are listed in table CLXVI; the total overhead costs are not included in this table. Prior to 1965 the costs are itemized in LWP 804.
The personnel that formed the Scout Project Office during Phase V are shown in figure 34.

The RPM funds for Langley Research Center NASA were supplemented by program funds from each program. The Scout Program share of costs to support LRC is itemized in table CLXVII. Prior to FY70 these requirements were mostly supplied by LRC-RPM funds.

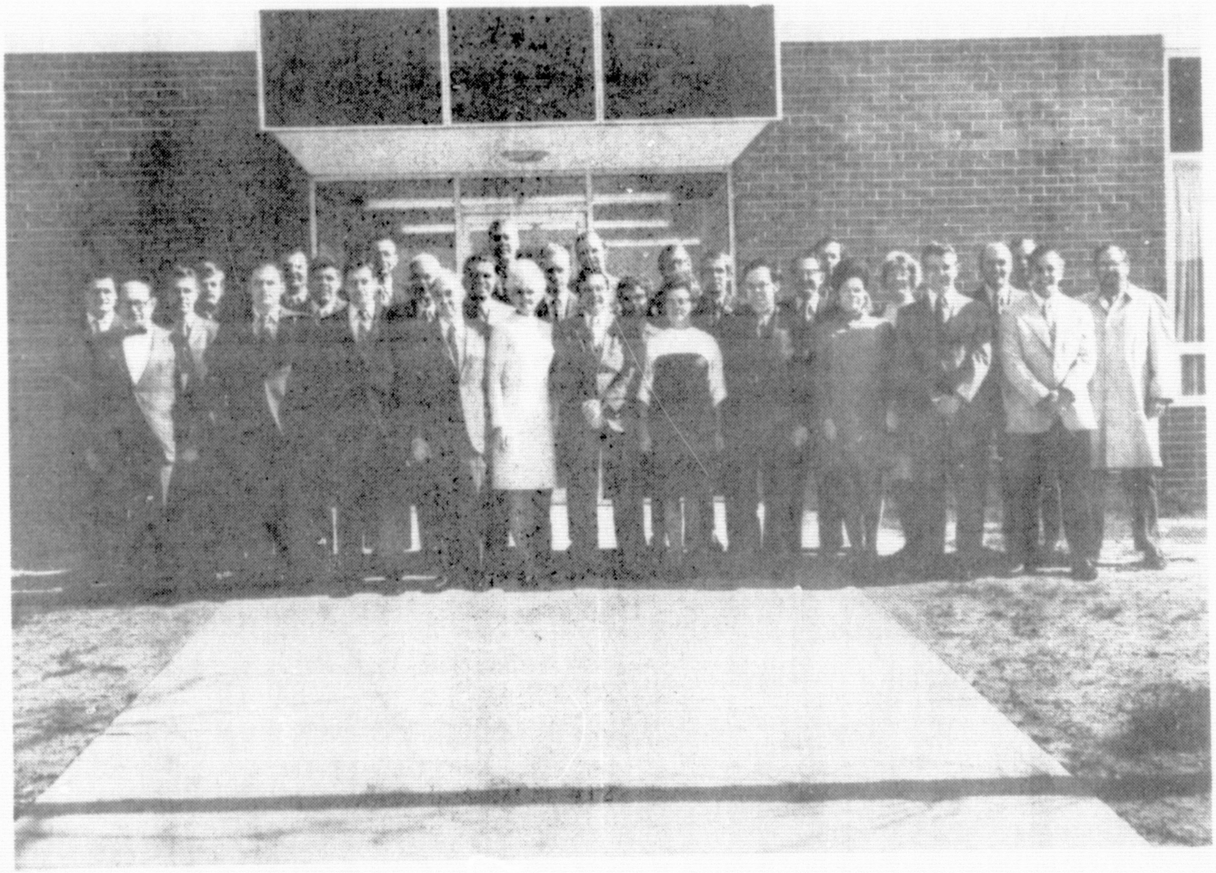


Figure 34.- SPO Personnel During Phase V.

TABLE CLXVI - LANGLEY INSTITUTIONAL SUPPORT - R AND D SCOUT PROGRAM (FY66-71)#.

	1966		1967		1968		1969		1970		1971			
	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	HOURS	COST
RESEARCH														
NASA														
Production	15,445	$ 81,144.67	15,482	$102,064.63	24,217	$160,928.95	1,955	$ 15,715.14	4,523	$ 39,151.88	13,458	$116,179.13		
SEAM	19,739	116,994.13	20,717	132,171.15	17,187	100,768.61	32,138	197,663.48	15,043	110,137.30	23,805	185,892.08		
Loads	0	0	0	0	0	0	0	0	1,951	17,753.67	2,382	24,074.37		
San Marco	1,889	13,351.49	2,268	17,526.70	1,194	8,518.63	1,656	13,422.15	7,831	70,936.50	7,663	71,742.78		
Delta	461	2,713.98	0	0	0	0	0	0	166	1,392.72	653	5,401.76		
SRT	9,382	54,786.84	4,921	20,138.65	5,933	37,164.12	9,178	78,861.17	0	0	799	7,713.13		
LRC Support	1,605	9,838.71	4,678	24,271.60	563	3,794.48	105	932.81	0	0	0	0		
AEC	2,047	10,258.66	0	0	0	0	0	0	0	0	96	1,077.44		
NAVY	6,332	37,867.18	3,488	24,510.62	872	6,106.18	4,816	37,572.79	0	0	0	0		
AIR FORCE	7,075	37,493.74	4,776	31,328.50	236	1,459.58	0	0	10,849	95,594.31	11,417	105,852.05		
TOTAL RESEARCH	63,975	$364,449.40	56,330	$362,011.85	50,202	$318,740.55	49,848	$344,167.54	40,363	$334,966.38	60,273	$517,932.74		
SERVICE														
NASA														
Production	4,392	$17,430.34	250	$ 983.37	626	$ 3,792.75	1,274	$ 6,691.76	530	$ 2,567.45	611	$ 4,050.72		
SEAM	18,416	83,944.14	11,657	52,680.77	14,333	70,663.76	15,495	75,617.86	16,006	82,051.60	8,113	52,307.27		
Loads	0	0	0	0	0	0	0	0	0	0	0	0		
San Marco	360	1,248.61	476	1,760.97	0	0	0	0	26	164.56	0	0		
Delta	127	336.95	0	0	0	0	0	0	364	1,782.04	2,534	20,607.27		
SRT	40	152.80	7	16.73	143	737.70	151	1,015.00	0	0	0	0		
LRC Support	3,387	16,152.68	3,727	20,196.26	5,091	29,963.95	612	2,844.28	0	0	0	0		
AEC	0	0	0	0	0	0	0	0	0	0	0	0		
NAVY	7,856	48,238.69	8,920	58,996.65	8,573	58,443.80	3,350	20,597.04	0	0	880	7,374.22		
AIR FORCE	153	674.70	324	2,180.76	160	1,198.08	295	1,752.73	1,865	11,395.71	1,655	12,113.43		
TOTAL SERVICE	34,731	$168,178.91	25,361	$136,815.51	28,926	$164,800.04	21,177	$108,518.67	18,791	$ 97,961.36	13,793	$ 96,452.91		
ADMINISTRATION	15,785	$ 79,136.59	11,911	$ 72,476.43	9,923	$ 62,285.76	9,910	$ 64,720.19	7,157	$ 54,828.62	227	$ 2,050.11		
*TOTAL	114,491	$611,764.90	93,602	$571,303.79	89,051	$545,826.35	80,935	$517,406.40	66,311	$487,756.36	74,293	$616,435.76	518,683	$3,350,493.56

---

*Overhead not included.
#Preceding data in Phases I, II, and III.

TABLE CLXVII - IN-HOUSE LANGLEY RESEARCH CENTER.

490 - FUNDS

P.R. NO.	ORDER NO.		OBLIGATION
		PHASE IV	
60.400.803	L-1360400803		$ 173.26
		PHASE IV SUBTOTAL	$ 173.26
		PHASE V	
FY 1970 AND PRIOR			
01.030.095	L-25815		$ 86.00
42.101.002	L-27402		340.00
40.101.010	L-34548		265.00
46.200.129	L-38001		2,448.00
52.320.104	L-42743		1,747.60
52.340.056	L-46987		26,054.80
52.340.056	L-46987-1		200.00
40.101.028	L-47271		378.10
40.101.028	L-47974		179.10
12.750.665	L-49093		8,882.80
11.230.846	L-51918		2,650.00
12.750.700	L-52203		2,856.00
52.310.134	L-55447		12,455.10
66.000.103	L-70776		16,008.74
66.000.104	L-70777		6,587.68
66.000.107	L-71083		3,616.20
66.000.105	L-71933		358.09
66.000.119	L-72437		145.53
66.000.118	L-72448		446.20
66.000.139	L-73616		614.75
66.000.140	L-73617		555.40
66.000.141	L-73987		2,588.16
66.000.131	L-74262		306.45
66.000.131	L-74263		1,343.07
66.000.143	L-74616		82.00
66.000.153	L-75016		1,271.05
66.000.159	L-75016-1		79.24
66.000.019	L-75016-2		167.18
66.000.158	L-75562		271.22
66.000.161	L-75662		17.75
66.000.161	L-75663		196.95
66.000.167	L-77087		156.44
66.000.167	L-77088		78.70
66.000.169	L-77604		11.92
66.000.190	L-79800		347.12
66.000.192	L-79800		179.87

TABLE CLXVII Continued - IN-HOUSE LANGLEY RESEARCH CENTER.

490 - FUNDS

PHASE V Continued

FY 1970 AND PRIOR Continued

P.R. NO.	ORDER NO.	OBLIGATION
40.101.015	L0152410787	$ 1,990.00
40.101.028	L0252220096	560.00
01.030.095	L0352220079	2,100.00
01.030.097	L0352220079-1	280.00
40.101.040	L0352220881	1,225.00
40.101.031	L0452230581	760.00
40.101.034	L0852230760	417.90
52.230.806	L0952230806	585.00
40.101.032	L1852220413	280.00
40.101.034	L1852230767	1,160.00
40.101.034	L1852230768	980.00
66.000.114	OL-71787	509.22
66.000.120	OL-73413	153.00
66.000.121	OL-73726	925.00
56.130.202	OL-74084	540.54
56.130.427	OL-74126-1	196.00
56.130.290	OL-74126	706.00
66.000.162	OL-74981	88.50
66.000.170	OL-76863	169.90
66.000.186	OL-77345	33.41
66.000.175	OL-77400	84.46
66.000.180	OL-77845	108.00
56.130.570	OL-78273	190.00
66.000.202	OL-79570	16.83
66.000.201	OL-80204	45.00
12.750.723	NAS1-7947-9	35,000.00
12.700.082	NAS1-7947-10	49,461.00
51.240.114	NAS1-8330	33.28
57.000.004	NAS1-8348	210.08
56.130.533	NAS1-9057	300.55
56.130.533	NAS1-9057-58	105.00
46.200.132	NAS1-9066-140	363.73
46.200.132	NAS1-9066-519	35.73
57.000.011	NAS1-9933	5,000.00
56.330.547	NAS1-10695-3	138.88
56.330.601	NAS1-10695-4	246.42
	FY 1970 AND PRIOR SUBTOTAL	$420,033.83

FY 1971

P.R. NO.	ORDER NO.	OBLIGATION
ADB100	L-15974	$ 7,109.43
52.210.691	L-54154	3,168.00

TABLE CLXVII Concluded - IN-HOUSE LANGLEY RESEARCH CENTER.

490 - FUNDS

P.R. NO.	ORDER NO.	OBLIGATION
	PHASE V Continued	
FY 1971 Continued		
66.000.211	L-80802	$ 105.00
47.000.011	L0152410367	233.82
47.000.013	L0352220683	1,925.00
40.101.040	L0352220881	1,225.00
47.000.016	L0452220818	600.00
52.230.179	L0552230179	174.12
40.101.039	L0952220768	245.00
47.000.011	L4752220514	730.00
66.000.200	OL-79632	498.00
11.000.266	NAS1-6090-92	31,000.00
46.200.132	NAS1-9066-361	356.75
46.200.284	NAS1-9788-533	105.00
46.200.284	NAS1-9788-570	6.50
46.200.284	NAS1-9788	553.97
52.410.837	NAS1-9789	150,000.00
52.110.328	NAS1-10363	11,688.00
52.210.569	NAS1-10369	4,052.50
52.220.185	NAS1-10380	22,998.00
52.220.116	NAS1-10381	8,149.00
52.210.580	NAS1-10407	8,950.00
52.310.135	NAS1-10415	4,020.00
52.310.130	NAS1-10419	3,195.72
52.210.575	NAS1-10449	11,055.00
52.310.131	NAS1-10519	6,740.00
52.110.318	NAS1-10612	8,569.00
57.110.693	NAS1-10648	3,860.00
52.110.323	NAS1-10659	8,675.00
	FY 1971 SUBTOTAL	$299,987.81

(c) The Scout travel budget was projected on a per-vehicle basis. The actuals and the budget averaged $20,000 per Scout vehicle. The estimated travel cost of each system is listed in table CLXVIII.

TABLE CLXVIII - AVERAGE UNIT SCOUT TRAVEL COSTS

	PER VEHICLE
QUALITY AND RELIABILITY	$1,200
PROPULSION	2,000
ELECTRONICS AND ELECTRICAL	2,100
GUIDANCE AND CONTROLS	1,800
CONTRACTING	1,600
*MANAGEMENT	2,300
OPERATIONS	2,500
PAYLOADS	4,000
MECHANICAL-STRUCTURES	2,100
PERFORMANCE	400
TOTAL	$20,000

*Does not include Advanced Planning.

Each agency paid for travel associated with their Scout vehicle, including any special requirements. These costs are shown in table CLXIX. The D.O.D. travel assessments per vehicle are itemized in table CLXX. Travel funds for the total Scout Program are charged to each current phase. The total travel costs are divided by the number of vehicles in each phase and each user is charged their appropriate share. To date, the unit cost has been $20,000 for each vehicle built and launched. Table CLXIX divides these costs by fiscal year.

A typical Navy launch, which included travel for Government personnel from the initiation of production to vehicle launch, is Scout S-162 as shown in figure 35.

(d) The total Scout shipping expenditures through 1971 are itemized in table CLXXI. All of the items shipped on the Scout program were by Government Bill of Lading (GBL).

TABLE CLXIX - TRAVEL FOR SCOUT PROGRAM

	FY 1965 & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	TOTAL
NASA								
Scout	$520,673	$ 52,212	$ 32,788	$ 41,700	$ 12,259	$ 15,218	$ 46,421	
San Marco	41,220	4,930	7,805	4,612	4,560	7,193	14,934	
SUBTOTAL NASA	$561,893	$ 57,142	$ 40,593	$ 46,312	$ 16,819	$ 22,411	$ 61,355	$ 806,525
NAVY								
R62-7087	$ 70,208	$ -164	$ 449	$ 163	$ 0	$ 0	$ 0	
R61-7154	21,483	0	0	0	0	0	0	
R62-7098	7,861	0	0	0	0	0	0	
SUBTOTAL NAVY	$ 99,552	$ -164	$ 449	$ 163	$ 0	$ 0	$ 0	$ 100,000
AIR FORCE								
62-6	$ 78,981	$ 10,289	$ 28,095	$ 9,969	$ -27	$ 0	$ 0	
63-29	23,143	26,762	0	15,904	-619	36	0	
63-32	69,981	0	0	0	0	0	0	
63-44	0	0	0	0	0	0	0	
66-95	0	0	18,779	12,229	55,608	62,674	43,014	
SUBTOTAL A.F.	$172,105	$ 37,051	$ 46,874	$ 38,102	$ 54,962	$ 63,383	$ 43,014	$ 455,491
ESRO								
ESRO IB	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 9,916	
ESRO IV	0	0	0	0	0	0	887	
SUBTOTAL ESRO	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 10,803	$ 10,803
TOTAL	$833,550	$ 94,029	$ 87,916	$ 84,577	$ 71,781	$ 85,794	$115,172	$1,372,819

TABLE CLXX - DOD TRAVEL THROUGH PHASE V

	FY 1965 & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	TOTAL
PHASE II								
111	$20,000							
116	20,000							
118	20,000							
119	20,000							
120	20,000							
PHASE III								
125	$20,000							
PHASE IV								
140	2,695	$17,305						
142		9,293	$10,707					
143			8,521	$11,479				
146				16,817	$ 3,183			
149					20,000			
154					20,000			
156					1,806	$18,194		
157					10,000	10,000		
162						20,000		
170							$7,000	
PHASE V								
176						14,516	5,484	
TOTAL	$122,695	$26,598	$19,228	$28,296	$54,989	$62,710	$12,484	$327,000

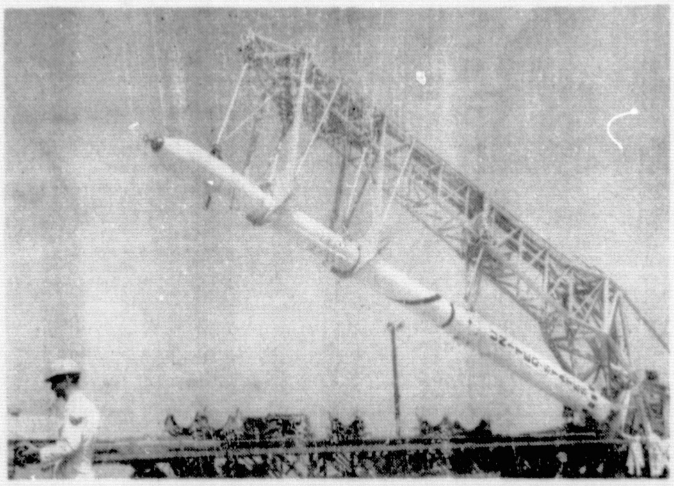


TABLE CLXXI - SCOUT SHIPPING EXPENDITURES

	FY 1965* & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	TOTAL
PROGRAM-180								($ 128.53)
L-32768				$ 5.85				5.85
NGR 34002108				13.90				13.90
NAS1-7256				25.00	$ 3.05			28.05
NAS1-9204					28.40		$ 29.50	57.90
NAS1-9852					6.55			6.55
NAS1-10000					15.00		1.28	16.28
PROGRAM-490								($489,148.09)
L46232						$ 33.50		33.50
L47001						2,760.00		2,760.00
L75663						9.45		9.45
L-84994					2,526.00			2,526.00
NAS1-3493	$ 2,684.80	$ 62.00			7.60			2,754.40
NAS1-3498	10,633.84	10,496.48						21,130.32
NAS1-3698					27.40			27.40
NAS1-4794		1,850.40		-390.00	559.65			2,020.05
NAS1-4795		2,592.00						2,592.00
NAS1-5592				-10.00		11.00		1.00
NAS1-5610			$ 570.80	30,690.26	10,501.99	10,855.38		52,618.43
NAS1-5880						21,780.06	92,673.82	114,453.88
NAS1-5883		368.00	7,070.52	104.96	564.40	20.14		8,128.02
NAS1-6020			11,082.83	2,528.08	8,165.99	132.04	30.27	21,939.21
NAS1-6378					56.71	21.28	4.83	82.82
NAS1-6868					12.05			12.05
NAS1-6935					339.22	4,497.94	5,138.31	9,975.47
NAS1-7102				178.50	5,408.44	703.25		6,290.19
NAS1-7199					5,800.41	45,256.23	4,521.68	55,578.32
NAS1-7256				707.49	12,989.13	52,358.00	41,233.75	107,288.37
NAS1-9258						1,603.12	2,284.55	3,887.67
NAS1-9325							136.80	136.80
NAS1-10000					1,261.98	54,325.90	15,824.34	71,412.22
NAS1-10481						1,919.20	1,560.82	3,480.02
NAS1-10404						10.50		10.50
PROGRAM-984								($ 31,283.62)
NAS1-3493				15.65				15.65
NAS1-3698		16.68	464.95	27.49				509.12
NAS1-4325				670.34				670.34
NAS1-4794	3,302.00							3,302.00
NAS1-5592				11.45				11.45
NAS1-5610				6,642.29				6,642.29
NAS1-5880				637.50				637.50
NAS1-5883				6,388.11				6,388.11
NAS1-6020			116.30	11,796.39				11,912.69
NAS1-6868			6.02	171.23				177.25
NAS1-6935				1,017.22				1,017.22
PROGRAM-984								($ 52,636.79)
NAS1-5880					2,403.75	255.05		2,658.80
NAS1-10000						49,906.34	71.65	49,977.99
REIMBURSABLES-490								($ 55,310.43)
NAS1-3698	3,486.37							3,486.37
NAS1-4664	2,254.43							2,254.43
NAS1-4794	144.00		1,845.60					1,989.60
NAS1-5610	4,745.20		15,563.55					20,308.75
NAS1-5883	7,232.47		6,294.39					13,526.86
NAS1-6020	9,861.73	24.74	3,834.02					13,720.49
NAS1-7256			23.93					23.93
TOTALS	$44,344.84	$15,410.30	$46,872.91	$61,231.71	$50,677.72	$246,458.38	$163,511.60	$628,507.46

---

*Does not include LRC-OA obligations for shipping costs (FY1959-65).

(e) Through 1971 the Scout Program has obligated $227,602.049.00. This includes $149,167,850.00 of NASA R & D funds and $13,976,893.00 of NASA Institutional funds. The details are shown below in table CLXXII.

(f) The expenditures for Spares by phase for each fiscal year are itemized in table CLXXIII.

TABLE CLXXII - SUMMARY OF SCOUT NASA, AEC, AND DOD PROGRAMS.

	OBLIGATED IN							
	FY 1965 & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	TOTAL
NASA FUNDS								
R & D								
*Development	$25,636.131	$ 320	$ 0	$ -22,157	$ 0	$ -32,000	$ 0	$ 25,582,294
*Production	29,498,520	6,613,778	6,642,504	5,261,213	12,703,806	13,159,154	13,729,814	87,608,789
Technology (SRT)	1,140.338	426,951	1,078,511	445,291	50,715	603,119	273,354	4,018,279
Experiments (LRC)	133.822	0	0	0	0	0	0	133,822
Spacecraft & S.A.	303,965	104,247	3,975	0	5,000	200,000	0	617,187
San Marco	2,173,219	903,701	17,816	118,589	14,599	0	0	3,227,924
Sys. Engrg. & Maint.	7,876,396	6,311,834	4,563,508	5,134,293	8,715	-15,176	-62	23,879,508
*C of F	2,633,132	0	0	0	0	0	0	2,633,132
Delta Motors	765,400	511,520	191,838	-1,843	0	0	0	1,466,915
Subtotal	$70,160,923	$14,892,351	$12,494,152	$10,935,386	$12,782,835	$13,915,097	$14,003,107	$149,167,850
LRC Support								
San Marco	$ 317,209	$ 14,600	$ 19,288	$ 8,519	$ 13,422	$ 17,754	$ 24,074	$ 414,866
Research & SRT	769,865	80,931	74,623	71,660	83,653	74,276	97,752	1,252,760
Scout	6,739,091	434,0[illegible]6	404,916	403,362	355,611	315,184	367,220	9,019,430
609A	212,859	0	0	0	0	0	0	212,859
Travel (NASA)	561,893	57,142	40,593	84,577	16,819	22,411	61,355	844,790
**Administrative	1,886,229	79,137	72,476	62,286	64,720	54,829	2,050	2,211,727
Delta	7,410	3,051	0	0	0	0	0	10,461
Subtotal	$10,494,556	$ 668,907	$ 611,896	$ 630,404	$ 534,225	$ 484,454	$ 552,451	$ 13,976,893
NASA Subtotal	$87,655,479	$15,561,258	$13,106,048	$11,565,790	$13,317,060	$14,399,551	$14,555,557	$163,144,743
DOD FUNDS								
R & D								
609A	$ 6,760,761	$ 0	$ 0	$ -3,595	$ 0	$ 0	$ 0	$ 6,757,166
Navy	9,689,502	-2,981	16,817	10	0	106,990	-71,660	9,738,678
USAF	18,355,810	1,052,768	14,986,214	8,902,402	-854,819	0	0	42,442,375
AEC	3,504,162	-1,106,598	0	1,000	-1,000	0	0	2,397,564
DOD Subtotal	$38,310,235	$ -56,811	$15,003,031	$ 8,899,817	$ -855,819	$ 106,990	$ -71,660	$ 61,335,783
TRUST FUNDS								
ESRO	$ 0	$ 0	$ 0	$ 0	$ 0	$ 1,861,910	$ 383,449	$ 2,245,359
San Marco	622,476	45,078	19,748	4,786	52,609	50,374	81,093	876,164
UK	0	0	0	0	0	0	0	0
TRUST FUNDS Subtotal	$ 622,476	$ 45,078	$ 19,748	$ 4,786	$ 52,609	$ 1,912,284	$ 464,542	$ 3,121,523
TOTAL	$119,587,391	$15,529,525	$28,132,827	$20,470,393	$12,513,850	$16,418,825	$14,943,439	$227,602,049

---

*Includes direct OSS obligations.
**Does not include FY63 through FY70 Overhead.

TABLE CLXXIII - SCOUT PROGRAM SPARES EXPENDITURES.

P.R. NO.	ORDER NO.	NASA GSE	NASA	VEHICLES		TOTAL
				*NAVY	AIR FORCE	
GSE SUBTOTAL						$ 371,550
**PHASE II SUBTOTAL						$ 574,529
**PHASE III SUBTOTAL						$ 885,042
PHASE IV						
60.400.387	L-61691		$ 76,902	$	$	$ 76,902
60.400.653	L-84997		34,631	65,369		100,000
60.400.816	L-84997		17,101			17,101
20.200.420	NAS1-3420-3(c6)		25,000	46,000	83,838	154,838
20.200.635	NAS1-3420-6(c11)				6,667	6,667
60.400.036	NAS1-3420-7		142,600			142,600
60.400.027	NAS1-3420-8(c18)		13,917			13,917
60.400.028	NAS1-3420-8(c21)		76			76
60.400.028	NAS1-3420-8(c23)		3,933			3,933
60.400.227	NAS1-3420-9		74,885			74,885
60.400.028	NAS1-3420-10		30,288			30,288
60.400.028	NAS1-3420-10(c1)		36,016			36,016
60.400.028	NAS1-3420-10(c22)		128			128
60.400.028	NAS1-3420-10(c24)		176			176
60.400.251	NAS1-3420-11		13,800			13,800
60.400.028	NAS1-3420-12		-3,025			-3,025
60.400.028	NAS1-3420-12(c25)		5,796			5,796
60.400.251	NAS1-3420-14		6,615			6,615
60.400.028	NAS1-3420-14(c27)		5,300			5,300
60.400.251	NAS1-3420-14(c28)			535		535
60.400.251	NAS1-3420-15		-2,933			-2,933
60.400.260	NAS1-3420-16(c26)		12,500			12,500
60.400.251	NAS1-3420-16(c29)			1,378		1,378
60.400.251	NAS1-3420-16(c30)		14,256			14,256
60.400.227	NAS1-3420-17		-18,000			-18,000
20.200.148	NAS1-3420		190,090			190,090
60.400.451	NAS1-4664-9		-77			-77
60.400.451	NAS1-4664-9-Ca1-1		479			479
60.400.451	NAS1-4664-9-Ca2-1		5,191			5,191
60.400.451	NAS1-4664-9-Ca5		1,600			1,600
60.400.451	NAS1-4664-9-Ca7		700			700
60.400.451	NAS1-4664-14-Ca3		9,420			9,420
60.400.451	NAS1-4664-14-Ca6		10,410			10,410

---

*Includes Navy Program funded by Air Force.

**Details available in Langley Working Paper 804 dated 10-20-69.

TABLE CLXXIII Continued - SCOUT PROGRAM SPARES EXPENDITURES.

P.R. NO.	ORDER NO.	NASA	VEHICLES *NAVY	VEHICLES AIR FORCE	TOTAL
PHASE IV Continued					
60.400.451	NAS1-4664-14-Ca9	$ 3,200	$	$	$ 3,200
60.400.451	NAS1-4664-14-Ca10	7,175			7,175
60.400.451	NAS1-4664-14-Ca11	298			298
60.400.451	NAS1-4664-14-Ca13	545			545
60.400.451	NAS1-4664-17-Ca8	5,200			5,200
60.400.451	NAS1-4664-17-Ca12	37,424			37,424
60.400.451	NAS1-4664-17-Ca14	14,000			14,000
60.400.451	NAS1-4664-17-Ca15	640			640
60.400.451	NAS1-4664-17-Ca16	63,495			63,495
60.400.451	NAS1-4664-17-Ca17	68,379			68,379
60.400.451	NAS1-4664-17-Ca18	4,221			4,221
60.400.602	NAS1-4664-17-Ca19	1,300			1,300
60.400.451	NAS1-4664-17-Ca19	150			150
60.400.451	NAS1-4664-19(c20)	410			410
60.400.602	NAS1-4664-19(c21)	3,130			3,130
60.400.451	NAS1-4664-21-Ca23-E	15,368			15,368
60.400.451	NAS1-4664-21-Ca24-L	4,057			4,057
60.400.451	NAS1-4664-21-17-L	-825			-825
**60.400.199	NAS1-4664(Task K)	330,938			330,938
60.400.575	NAS1-4793-7	800			800
60.400.607	NAS1-4793-7	1,699			1,699
60.400.576	NAS1-4794-7	50			50
60.400.577	NAS1-4795-7	240			240
60.400.610	NAS1-4795-7	1,288			1,288
60.400.741	NAS1-6020-7-L	22,107			22,107
**60.400.649	NAS1-6020-8-Ca1-L	7,200			7,200
60.400.649	NAS1-6020-8-Ca2-L		1,500		1,500
60.400.649	NAS1-6020-8-Ca3-L		6,000		6,000
60.400.649	NAS1-6020-8-Ca4-L		22,000		22,000
60.400.649	NAS1-6020-8-Ca6-L		24,000		24,000
60.400.649	NAS1-6020-8-Ca7-L		7,000		7,000
60.400.649	NAS1-6020-8-Ca8-L		12,000		12,000
**60.400.557	NAS1-6020-9-L	32,948			32,948
60.400.557	NAS1-6020-11-Ca9-L		136		136
60.400.649	NAS1-6020-11-Ca11-L		2,337		2,337
60.400.649	NAS1-6020-11-Ca12-L		18,648		18,648
60.400.649	NAS1-6020-11-Ca13-L		5,213		5,213
60.400.729	NAS1-6020-11-Ca13-L		-1,225		-1,225
60.400.729	NAS1-6020-11-Ca13-1-L		-6,000		-6,000
60.400.649	NAS1-6020-11-Ca14-L		5,600		5,600
60.400.729	NAS1-6020-11-Ca14-L		214		214

---

*Includes Navy Program funded by Air Force.

**SEAM (logistics).

TABLE CLXXIII Continued - SCOUT PROGRAM SPARES EXPENDITURES.

P.R. NO.	ORDER NO.	NASA	VEHICLES *NAVY	 AIR FORCE	TOTAL
PHASE IV Continued					
**60.400.557	NAS1-6020-L	$ 252,604	$	$	$ 252,604
60.400.729	NAS1-6020-Ca42-L	68,500			68,500
60.400.729	NAS1-6020-Ca44-L	10,000			10,000
60.400.729	NAS1-6020-Ca46-L	1,900			1,900
60.400.729	NAS1-6020-Ca50-L	5,000			5,000
	PHASE IV SUBTOTAL	$1,671,216	$210,705	$90,505	$1,972,426
PHASE V					
60.400.816	L-84997	$ 59,894	$	$	$ 59,894
60.400.958	NAS1-1970-9	288			288
60.400.729	NAS1-6020-8-Ca1-L	13			13
60.400.729	NAS1-6020-8-Ca2-L	430			430
60.400.729	NAS1-6020-8-Ca3-L	86			86
60.400.729	NAS1-6020-8-Ca4-L	2,768			2,768
60.400.729	NAS1-6020-8-Ca6-L	-743			-743
60.400.729	NAS1-6020-8-Ca7-L	5,970			5,970
60.400.729	NAS1-6020-8-Ca8-L	374			374
60.400.729	NAS1-6020-8-Ca10-L	78			78
60.400.557	NAS1-6020-9-L	219,656			219,656
60.400.729	NAS1-6020-11-Ca13-1-L	45,000			45,000
60.400.729	NAS1-6020-14-Ca17-L	95	690		785
60.400.729	NAS1-6020-14-Ca19-L	9,717			9,717
60.400.729	NAS1-6020-14-Ca24-L	11,918			11,918
60.400.729	NAS1-6020-14-Ca25-L	1,450			1,450
60.400.729	NAS1-6020-14-Ca26-L	165			165
60.400.729	NAS1-6020-14-Ca27-L	1,287			1,287
60.400.729	NAS1-6020-14-Ca29-L	3,505			3,505
60.400.729	NAS1-6020-14-Ca33-L	734			734
60.400.729	NAS1-6020-Ca40-L	2,550			2,550
60.400.729	NAS1-6020-20-Ca40-L		-425		-425
60.400.729	NAS1-6020-20-Ca42-L		-3,475		-3,475
60.400.729	NAS1-6020-20-Ca43-L		6,771		6,771
60.400.729	NAS1-6020-20-Ca44-L		-4,188		-4,188
60.400.729	NAS1-6020-20-Ca46-L		-133		-133
60.400.729	NAS1-6020-20-Ca50-L		-100		-100
60.400.773	NAS1-6020-20-Ca52-L	**1,700	-94		1,606
60.400.729	NAS1-6020-20-Ca53-L		-1,013		-1,013
**60.400.773	NAS1-6020-20-Ca53-L	17,000			17,000
60.400.729	NAS1-6020-20-Ca55-L		-4,251		-4,251
**60.400.773	NAS1-6020-20-Ca55-L	8,800			8,800
60.400.729	NAS1-6020-20-Ca58-L		1,157		1,157
60.400.729	NAS1-6020-20-Ca59-L		2,305		2,305

---

*Inclues Navy Program funded by Air Force.

**SEAM (logistics).

TABLE CLXXIII Concluded - SCOUT PROGRAM SPARES EXPENDITURES.

P.R. NO.	ORDER NO.	NASA	VEHICLES *NAVY	VEHICLES AIR FORCE	TOTAL
PHASE V Continued					
60.400.729	NAS1-6020-28-Ca60-L	$ 4,839	$ 8,836		$ 13,675
60.400.729	NAS1-6020-28-Ca62-L		5,302		5,302
60.400.729	NAS1-6020-28-Ca63-L		3,025		3,025
60.400.729	NAS1-6020-28-Ca64-L		4,470		4,470
60.400.729	NAS1-6020-28-Ca65-L		3,820		3,820
60.400.729	NAS1-6020-28-Ca66-L		8,375		8,375
60.400.729	NAS1-6020-28-Ca67-L		165		165
60.400.729	NAS1-6020-28-Ca70-L		1,749		1,749
60.400.729	NAS1-6020-36(M20)-L	-630			-630
60.400.729	NAS1-6020-36(M28)-L	-888			-888
60.400.729	NAS1-6020-36-Ca65A-L	-267			-267
60.400.729	NAS1-6020-36-Ca68-L		22,448		22,448
60.400.729	NAS1-6020-36-Ca72-L	6,321	7,189		13,510
60.400.729	NAS1-6020-36-Ca74-L	21,804			21,804
60.400.729	NAS1-6020-36-Ca75-L	-141	600		459
60.400.729	NAS1-6020-36-Ca76-L	4,965			4,965
60.400.790	NAS1-7256-18-L	245,000	12,279		257,279
60.400.790	NAS1-7256-18-L(ESRO)	200,000			200,000
60.400.881	NAS1-7256-M	500,000			500,000
	PHASE V SUBTOTAL	$1,373,738	$75,502		$1,449,240

*Includes Navy Program funded by Air Force.

(g) The costs of keeping Wallops Island and Western Test Range (VAFB) as Scout launch sites are itemized in tables CLXXIV and CLXXV.

A Scout launch tower was built in 1959. This was used for 25 launches. In 1966 a new Mark I launcher was built. This is still currently in use. The expenditures listed are total Scout costs at Wallops Island and include LTV contracts, local expenditures (funded by subauthorizations), G.S.E. items (including motor dollies), W.I. Spares, and San Marco G.S.E. training expenses.

In 1961 a second launch site at Western Test Range (VAFB) was planned. The first launch took place in 1963. This launch site included electronic G.S.E. buildings furnished by the Air Force. It included Navy funds for checkout equipment and NASA funds for the launch complex. It was a joint NASA-DOD effort and included the same expenses itemized for Wallops Island. The Mark I launcher was designed and initially installed at VAFB. FY 1962 funds included the cost of this complex.

TABLE CLXXIV - WALLOPS - GSE EXPENDITURES

	NASA
FY59 FUNDS	
LTV	$ 193,237.00
Others	193,754.57
FY60 FUNDS	
Others	180,697.90
FY61 FUNDS	
LTV	55,000.00
Others	33,287.08
Spares	179,209.00
FY62 FUNDS	
LTV	7,800.00
LTV-C of F	797,265.00
Aerojet	8,204.00
Others	125,142.17
Others-C of F	635,866.43
Suballotment	11,340.00
FY63 FUNDS	
LTV	223,482.00
Aerojet	14,215.00
Others	127,276.78
Spares	150,641.04
Suballotment-S.M	37,973.94
Suballotment	285,067.18
LTV-S.M.	859,537.00
FY64 FUNDS	
LTV	93,266.00
Others	79,365.43
Spares	40,000.00
Suballotment	40,000.00
LTV-S.M.	37,449.00
FY65 FUNDS	
LTV	40,475.00
Others	66,070.63
Suballotment	85,000.00
FY66 FUNDS	
LTV	$ 403,417.80
Others	14,624.09
Suballotment	59,953.53
FY67 FUNDS	
LTV	6,297.00
Others	18,096.22
Suballotment	19,993.14
FY68 FUNDS	
LTV	11,321.80
Others	20,429.65
Suballotment	72,449.00
FY69 FUNDS	
LTV	378,564.48
Others	437.95
FY70 FUNDS	
LTV	766,615.42
Others	6,345.50
Suballotment	85,000.00
FY71 FUNDS	
LTV	892,416.00
Others	7,895.34
Suballotment	75,000.00
TOTAL	$7,439,479.07

TABLE CLXXV - WTR - GSE EXPENDITURES

	NASA	NAVY	AIR FORCE
*FY60 FUNDS			
FY61 FUNDS			
LTV	$ 100,000.00	$ 300,000.00	
Others		543.73	
FY62 FUNDS			
LTV	$ 753,350.00	$1,152,272.00	$ 643,270.00
Gisholt	34,500.00		
Aerojet	524.00	23,874.00	
Others	8,877.06	10,463.42	2,539.66
**Suballotment	28,000.00		
LTV-Special			29,568.00
*FY63 FUNDS			
LTV	$ 91,903.94		$ 49,920.00
Aerojet	932.00		
Others	30,327.55		34,734.82
FY64 FUNDS			
LTV	$ 3,688.00		
Others	25,633.52		
*FY65 FUNDS			
LTV	$ 863,539.00		$ 200,000.00
Others	15,177.21		
FY66 FUNDS			
LTV	$ 22,644.00		$ 200,000.00
Others	30,094.29		
Suballotment	24,799.99		
FY67 FUNDS			
LTV	$ 5,750.00		
Others	2,373.39		
Suballotments	46,694.79		
FY68 FUNDS			
LTV	$ 9,299.73		
Others	20,970.03		
Suballotments	37,441.84		
FY69 FUNDS			
LTV	$ 11,161.60		
Others	23,556.44		
Suballotment	25,000.00		
FY70 FUNDS			
LTV	$ 94,240.43		
Others	4,927.00		
Suballotment	50.000.00		
FY71 FUNDS			
LTV	$ 538,151.46		
Others	23,191.30		
Suballotment	50,000.00		
TOTAL	$2,976,748.57	$1,487,153.15	$1,160,032.48

---

*Does not include OSS Direct to PLOO $1,200,000.00 FY60; $177,000.00 FY63; and $98,700.00 FY65.

**C of F Goddard (GSFC).

(h) A summary of the new major Scout Programs developed during Phases IV and V is shown below. Table CLXXVI contains cost data on the 42-inch heat shield. Figure CLXXVII itemizes all the propulsion and pyrotechnic shelf life costs.

TABLE CLXXVI - 42-INCH HEAT SHIELD

P.R. NO.	CONTRACT NO.	ITEM	FUNDS	AMOUNT
60.900.051	NAS1-6935-41	S-144C Heat Shield	PJ	$ 66,000.00
60.900.140	NAS1-6935-41-4(M3)	Scout-D Wind Tun.Test	PJ	50,000.00
60.900.144	NAS1-6935-41-4(M3)	Wind Tunnel Test Data	PJ	11,420.00
66.000.024	NAS1-6935-41-7(M5)	Add Door for Heat Shield	PK	3,254.00
		TOTAL 42-INCH HEAT SHIELD		$130,674.00

TABLE CLXXVII - SOLID PROPULSION & PYROTECHNIC SHELF LIFE & AGING PROGRAMS

SECOND STAGE

60.400.773	NAS1-6020-19-Ca48-S	Ext.Shlf.Life Init.	NG	$ 736.00
60.400.925	NAS1-6935-26	Ext.Shlf.Life Castor IIA	PI	13,100.00
60.400.930	NAS1-6935-27	Castor II Aging Test.	PI	2,680.00
60.900.023	NAS1-7256-27-Ca28-S	Castor II Shlf.Life Ext.	NH	80,000.00
60.900.101	NAS1-7256-27-Ca28-S	Castor II Shlf.Life Ext.	PK	-4,935.00
		SECOND STAGE SUBTOTAL		$ 98,581.00

THIRD STAGE

60.400.860	NAS1-6020-29(M23)-K	EX-38 Cart.Ext.Shlf.Life	SH	$ 1,486.15
60.900.054	NAS1-6935-43	X-259 Shlf. Life Study	NHPJ	40,239.00
60.400.532	NAS1-5883	X-259 Rocket Motor	PF	61,861.00
		THIRD STAGE SUBTOTAL		$103,586.15

FOURTH STAGE

60.400.328	NAS1-3698	2 X-258 Motors	NG	$ 58,965 00
60.400.686	NAS1-5883	3 X-258 Motors	PD	97,740.00
60.400.675	NAS1-6020-16-Ca38-S11	HOLEX Bolt Shelf Life Tests	SHNH	318.00
60.400.675	NAS1-6020-19-Ca37-S10	X-258 Motor Aging Prog.	SH	45,587.00
60.400.773	NAS1-6020-19-Ca37-S10	X-258 Margin of Safety	SH	2,768.00
60.400.675	NAS1-6020-19-Ca37-S10	X-258 Aging Prog.-Igniters	SH	5,473.00
60.400.773	NAS1-6020-19-Ca37-S10	X-258 Aging Program	SH	26,940.00
60.900.054	NAS1-6935-43	X-258 Shelf Life Study	NHPJ	10,000.00
60.900.023	NAS1-7256-20-Ca19-S	X-258 Ign.Shlf.Lf.Prog.	PJ	10,195.00
60.900.023	NAS1-7256-27-Ca25-S	X-258 Ign.Shlf.Lf.Verif.	NHPJ	39,838.00
60.900.023	NAS1-7256-33-Ca20-S	X-258 Ign.Shlf.Lf.Verif.	NHPJ	10,312.00
60.400.878	NAS1-6935-22	FW-4S Shlf. Life Ext.	PI	17,257.00
60.900.026	NAS1-6935-38	FW-4S Shlf. Life Ext.	PJ	84,000.00
		FOURTH STAGE SUBTOTAL		$409,393.00

TOTAL SOLID PROPULSION & PYROTECHNIC SHELF LIFE & AGING PROGRAMS $611,560.15

2. MANAGEMENT

PRECEDING PAGE BLANK NOT FILMED

2. (a) The total manpower committed to the Scout Program consisted of the following:

(1) NASA Scout Project Office
(2) NASA Scout Support
(3) DOD Plant Representatives
(4) DOD 6595th Space Test Wing (A.F.)
(5) DOD SAMSO Management (A.F.)
(6) LTV Prime Contractor Personnel
    A. Dallas
    B. Field Teams
(7) Subcontractor Personnel
(8) SRT Contractors (less than 1 percent) (Details shown in Appendix E.)

The man years of effort for each fiscal year that each contributed to the Scout Program are shown in table CLXXVIII.

Details of the distribution of manpower by the DOD Naval Plant Representative Office at Dallas are shown in table CLXXIX.

The main group of Government manpower was at the NASA Langley Research Center. Using FY 1971 as an example, 32 man-years of effort were in the Scout Project Office. An additional dozen man-years of effort were supplied by LRC Divisions as required by the Scout Program. Of these 44 man-years of effort, 27 man-years were for NASA missions and 8 for Navy missions. The Air Force and AEC programs had been completed in prior years and the reimbursable international programs were just getting started. One man-year of effort was devoted to the Italian San Marco Cooperative Program and 6 man-years were used for research and development programs related to the Scout vehicle program.

The complete detailed manpower distribution for the Scout Program at the Langley Research Center is shown in table CLXXX. Appendix F shows a typical Monthly Contractor Resources Utilization Graphic Presentation of the Scout Program. The sample documentation used is for the contract period beginning November 1970.

(b) Thirty-nine Scouts have been launched in this time period making a total of 76 Scout launches through Phase V. Figures 36 and 37 illustrate a few of these successful operations. Table CLXXXI itemizes the statistics of these launches and includes data on the spacecraft in orbit. Of the 76 launches 46 were for NASA and 30 for the Department of Defense. The 46 NASA launches include 11 international programs. The 76 launches were for 58 orbits, 12 reentries, and 6 space probes. Although 63 of the 76 were successful, they include 9 development and 14 prototype launches. Therefore the Scout Program has had 50 of the 53 operational launches successfully launched for a 95 percent success ratio. The Scout Project was designated Project Manager for ESRO-IB as described in Appendix G.

TABLE CLXXVIII - SCOUT PROGRAM MAN YEARS OF EFFORT BY FISCAL YEAR.

BASED ON AVERAGE FOR FISCAL YEAR		FY 1964		FY 1965		FY 1966		FY 1967		FY 1968	
		MAN-YEARS	%	MAN-YEARS	%	MAN-YEARS	%	MAN-YEARS	%	MAN-YEARS	%
NASA/LRC	SPO	46	3.9	38	4.2	37	3.4	29	3.4	25	3.3
	SUPPORT	42	3.6	51	5.6	18	1.7	14	1.7	15	2.0
DOD	PLANT REPS.	31	2.7	25	2.7	30	2.7	11	1.3	10	1.3
	LAUNCH SUPP.	140	12.0	150	16.5	150	13.8	150	17.8	135	17.6
LTV PRIME	DALLAS	526	45.0	367	40.2	500	45.9	453	53.7	435	56.9
	FIELD	97	8.3	88	9.6	95	8.7	73	8.7	56	7.3
	SUBS	130	11.1	50	5.5	200	18.4	30	3.6	22	2.9
MOTORS	AEROJET	89	7.6	41	4.5	20	1.8	18	2.1	15	2.0
	HERCULES	46	3.9	62	6.8	20	1.8	31	3.8	33	4.3
	THIOKOL HUNTSV.	23	1.9	40	4.4	20	1.8	22	2.6	12	1.6
	THIOKOL ELKTON										
	UTC							12	1.4	6	0.8
TOTAL		1,170	100.0	912	100.0	1,090	100.0	843	100.0	764	100.0

BASED ON AVERAGE FOR FISCAL YEAR		FY 1969		FY 1970		FY 1971	
		MAN-YEARS	%	MAN-YEARS	%	MAN-YEARS	%
NASA/LRC	SPO	23	3.7	23	4.3	26	5.3
	SUPPORT	7	1.1	6	1.1	9	1.8
DOD	PLANT REPS.	8	1.3	11	2.1	8	1.6
	LAUNCH SUPP.	110	17.6	65	12.3	12	2.5
LTV PRIME	DALLAS	353	56.4	324	61.0	303	62.0
	FIELD	47	7.5	41	7.7	75	15.3
	SUBS	20	3.2	16	3.0	14	2.9
MOTORS	AEROJET	13	2.1	8	1.5	-	-
	HERCULES	8	1.3	9	1.7	-	-
	THIOKOL HUNTSV.	27	4.3	2	0.4	-	-
	THIOKOL ELKTON						
	UTC	10	1.6	26	4.9	42	8.6
TOTAL		626	100.0	531	100.0	489	100.0

TABLE CLXXIX - DISTRIBUTION OF MANPOWER BY DOD NAVPLANTREPO AT DALLAS.

Services	FY 1964		FY 1965		FY 1966		FY-1967		FY-1968	
	Man-Years	%	Man-Years	%	Man-Years	%	Man-Years	%	Man-Years	%
Contracts	4.0	26.0	5.8	38.1	5.5	33.1	4.1	32.5	3.5	41.2
Engineering	1.8	11.6	1.5	9.9	1.5	9.0	0.1	0.8	-	-
Industrial	0.3	1.9	0.5	3.3	0.5	3.0	0.5	4.0	0.6	7.1
Quality	8.3	54.0	6.3	41.5	8.0	48.3	6.9	54.8	4.0	47.0
Administration	1.0	6.5	1.1	7.2	1.1	6.6	1.0	7.9	0.4	4.7
Total	15.4	100.0	15.2	100.0	16.6	100.0	12.6*	100.0	8.5*	100.0

Services	FY 1969		FY 1970		FY 1971	
	Man-Years	%	Man-Years	%	Man-Years	%
Contracts	3.8	48.7	4.1	50.0	3.6	47.4
Engineering	-	-	-	-	-	-
Industrial	0.5	6.4	0.6	7.3	0.2	2.6
Quality	3.5	44.9	3.5	42.7	3.8	50.0
Administration	-	-	-	-	-	-
Total	7.8*	100.0	8.2*	100.0	7.6	100.0

* Based upon 1976 Hours/Man-Year

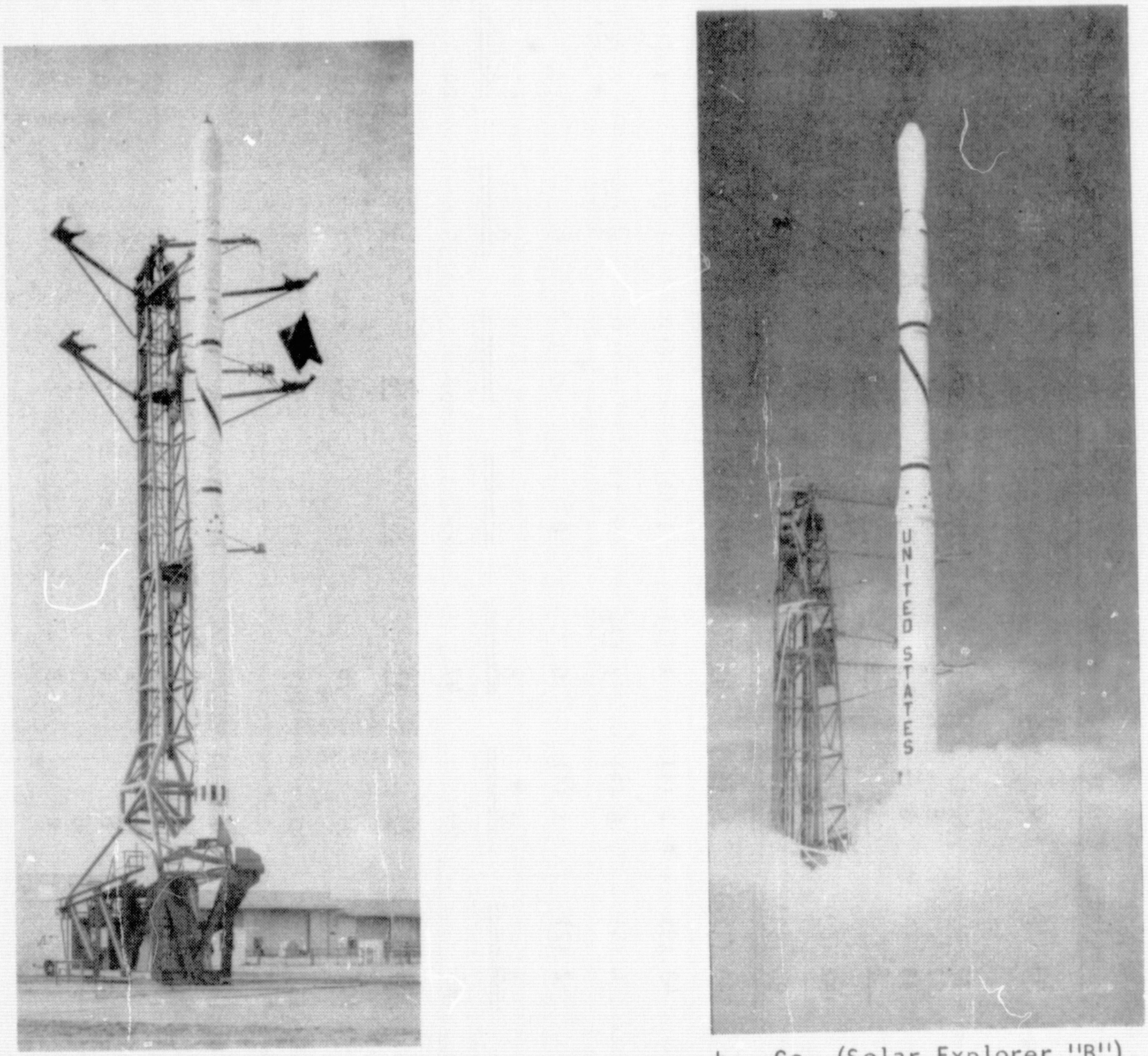
TABLE CLXXX - LRC SCOUT DIRECT MANPOWER

FISCAL YEAR	FY 1965 & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971
DEV (890)	44 (16)	0	0	0	0	0	0
PROD (490)							
NASA	77	12	8	18	20	21	27
NAVY	27	8	6	5	10	8	8
AIR FORCE	33	6	2	1	0	0	0
AEC	5	1	0	0	0	0	0
490 SUBTOTAL	142 (69)	27 (20)	16 (14)	24 (15)	30 (23)	29 (23)	35 (26)*
SEAM (497)	80 (37)	28 (17)	27 (15)	16 (10)	0	0	0
TOTAL SCOUT PROGRAM	266 (122)	55 (37)	43 (29)	40 (25)	30 (23)	29 (23)	35 (26)
SAN MARCO (894)	43 (9)	2 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
SRT (180)	4 (4)	6 (3)	3 (3)	4 (3)	7 (4)	5 (4)	6 (5)
+DELTA (492)	2 (2)	1 (1)	0	0	0	0	0
ESRO	0	0	0	0	0	0	2
LRC DIRECT	315	64	47	45	38	35	44
LRC INDIRECT	186	27	31	20	16	15	7*
LRC TOTAL	501	91	78	65	54	50	51
SCOUT PROJECT OFFICE TOTAL	(137)	(42)	(33)	(29)	(28)	(28)	(32)

Scouts in Process at the Beginning of the Fiscal Year

	FY 1965 & PRIOR	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971
NASA	68	12	15	1	18	14	13
NAVY	29	8	12	9	12	12	5
AIR FORCE	26	6	4	12	0	0	0
AEC	4	0	0	0	0	0	0
EUROPEAN	0	0	0	0	0	1	3

( ) In Project Office.
*Prior to 1971 the off-site personnel were listed as indirect.
+Common procurement of upper stage motors.

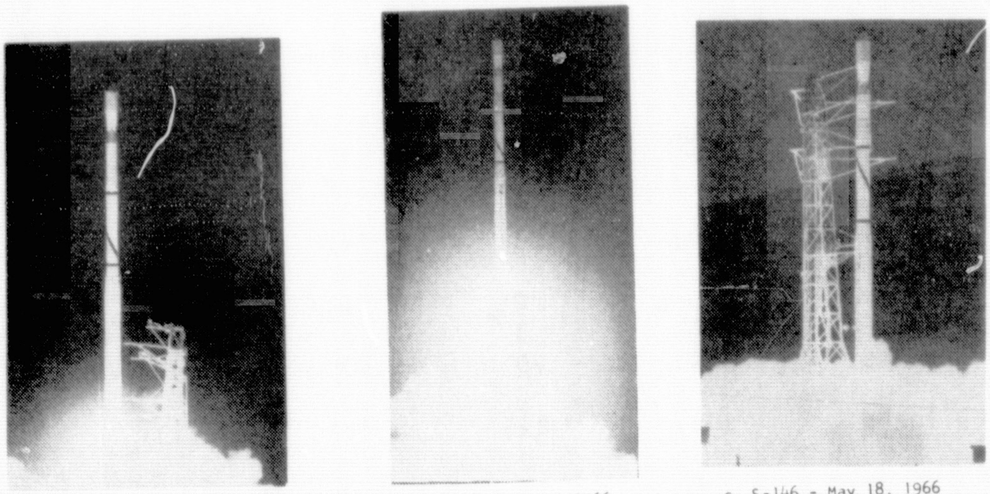


a. Ready

b. Go. (Solar Explorer "B")

Figure 36.- The 60th Scout launch, the 27th from Wallops Island, the 31st NASA Scout Mission on a Scout B, March 5, 1968.

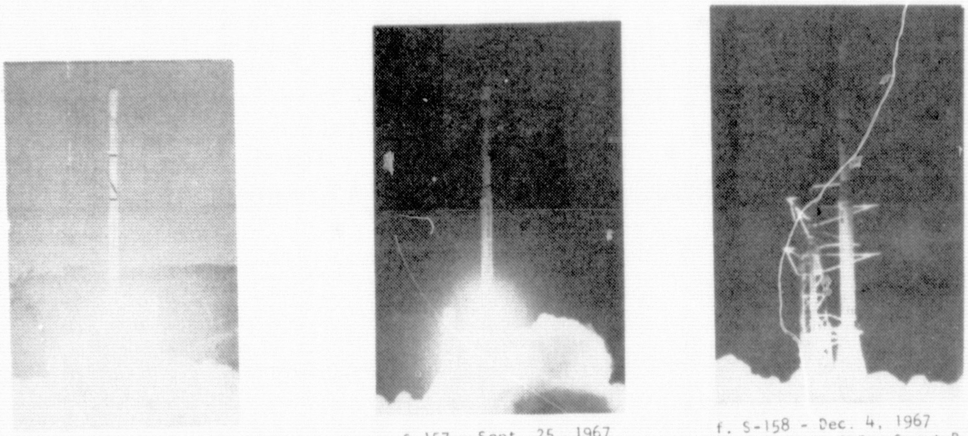
(c) The Job Orders completed to date for the Scout Program are listed in tables CLXXXII (NASA) and CLXXXIII (DOD). This Job Order system of the Langley Research Center accounted for all costs of each action associated with the specific title of the Job Order. Each Job Order is a specific program that is derived from the NASA Agencywide Funding Code System. Table CLXXXIV itemizes this system.



a. S-140 - Dec. 21, 1955
Navy-5 - Scout A.

b. S-143 - Mar. 25, 1966
Navy-7 - Scout A.

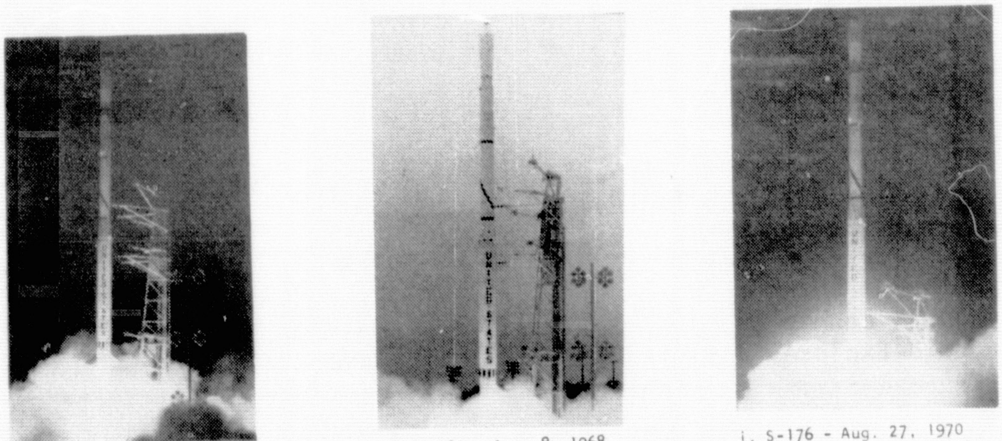
c. S-146 - May 18, 1966
Navy 8 - Scout A.



d. S-149 - Aug. 17, 1966
Navy-9 - Scout A.

e. S-157 - Sept. 25, 1967
Navy-12 - Scout A.

f. S-158 - Dec. 4, 1967
A.F.-OV5 - Scout B.



g. S-162 - Mar. 1, 1968
Navy-13 - Scout A.

h. S-165 - Aug. 8, 1968
AD-II-C - Scout B.

i. S-176 - Aug. 27, 1970
Navy-14 - Scout A.

Figure 37.- The Western Test Range (VAFB) contributed these nine launches to boost the Scout success record.

TABLE CLXXXI - SCOUT LAUNCH RECORD

	Through Phase III	Phase IV Management	Phase V Incentive	Total
Success	(26)	(23)	(14)	(63)
Probes	5	0	1	6
Reentry	4	3	3	10
Orbits	17	20	10	47
Failures	(11)	(2)	(0)	(13)
Probes	0	0	0	0
Reentry	2	0	0	2
Orbits	9	2	0	11
TOTAL	37	25	14	76

Successful Orbits	Explorer Number	Total Spacecraft	Decayed	Presently In Orbit
ADIE*	IX, XIX, XXIV & XXV, XXXIX & XL	7	2	5
Air Force Research		5	1	4
Air Force Special		2		2
Army - SECOR		1		1
Beacon - S-66	XXII, XXVII	2		2
ESRO	XXXVIII, XLI	3	1	2
French		2		2
German	AZUR	1		1
Ionosphere - S-48	XX	1		1
Micrometeoroid**	XVI, XXIII	2	1	1
Navy		13		13
OFO		1		1
San Marco		3	2	1
SAS	XLII	1		1
SOLRAD	XXX, XXXVII, XLIV	3		3
United Kingdom	Ariel II, Ariel III	2	1	1
SSS	XLV	1	-	1
TOTAL		50	8	42

*Includes a Dual Launch.

**Micrometeoroid Explorer XIII is listed as a failure.

Launches	All	Launch Site	
NASA	40/46 = 87%	Wallops	29/34 = 85%
DOD	23/30 = 73%	WTR	30/38 = 79%
		Africa	4/4 = 100%

TABLE CLXXXII - COMPLETED NASA SCOUT R AND D PROGRAM NUMBERS

	J.O.	JOB
180-06-01-05-00-9-004	RAS-131T	Oper. Perform. and Dispersion Computer Program
180-05-01-01-00-5-004	RAS-132T	Destruct System Module
180-32-09-01-00-5-004	RAS-133T	X-259 Load and Static Test
180-09-07-01-00-6-004	RAS-134	Electrostatic Potential Characteristics
497-90-00-20-00-6-004	RAS-135T	Systems Engineering - Sustaining Engineering FY66
497-90-00-21-00-6-004	RAS-136T	Systems Engineering Maint. & GSE WI FY66
497-90-00-23-00-6-004	RAS-137T	Systems Engineering Maint. & GSE WTR FY66
497-90-00-16-00-6-004	RAS-138T	Systems Engineering - Production Improvement FY66
870-31-16-07-00-6-004	RAS-139	S-53 Separation System (Subauthorization)
871-31-29-07-00-6-004	RAS-141	S-53 and ESRO Separation Systems (Subauthorization)
180-19-03-01-23-6-004	RAS-143T	Fourth-Stage Attitude Correction Sys. (Des. Def.)
180-32-07-10-00-7-004	RAS-144	Algol Pyrogen Igniter
870-31-16-07-00-6-004	RAS-145	S-53 Separation System (Subauthorization)
497-90-00-21-00-7-004	RAS-146T	Maint. & GSE at W.I. for Support of Scout Ops. FY67
497-90-00-23-00-7-004	RAS-147T	Maint. & GSE at WTR for Support of Scout Ops. FY67
497-90-00-16-00-7-004	RAS-148T	Product Improvement Program in Support of Scout Ops. FY67
497-90-00-20-00-7-004	RAS-149T	Sys. Engineering in Support of Scout Ops. FY67
894-09-10-15-00-8-004	RAS-150T	San Marco - Indian Ocean Program - Phase IIIB
180-06-06-08-00-9-004	RAS-151T	Error Analysis of Orbital Results of Scout Vehicle
180-19-03-02-00-9-004	RAS-152T	Development of Guidance Roll Compensation System
180-59-04-01-00-7-004	RAS-154T	Investigation Cocooning Solid Propellant Flt. Vehicles
180-17-01-01-00-6-004	RAS-155T	Study to Eliminate Init. Launch Azimuth Errors
180-32-09-02-00-7-004	RAS-156T	Investigation Fiberglas Filament Damage to Rocket Case
490-03-00-26-00-0-004	RAS-157T	Fifth Stage Velocity Package and BE-3 Motor
497-92-00-01-00-7-004	RAS-160	FW-4S Motor Case Load Tests for Delta
497-90-00-21-00-8-004	RAS-161T	Maint. & GSE at W.I. for Support of Scout Ops. FY68
497-90-00-23-00-8-004	RAS-162T	Maint. & GSE at WTR for Support of Scout Ops. FY68
497-90-00-16-00-8-004	RAS-163T	Product Improv. Program in Support of Scout Ops. FY68
497-90-00-20-00-8-004	RAS-164T	System Engineering in Support of Scout Ops. FY68
180-66-04-01-00-8-004	RAS-165T	Investigation of Pitch-up-at-launch Anomaly
180-19-03-03-23-8-004	RAS-166T	Control System Deadband Integrator
180-19-03-04-23-8-004	RAS-167T	Feasibility Study of Headend Steering
180-24-04-01-00-0-004	RAS-168T	S-Band
180-24-04-03-00-0-004	RAS-170T	Analysis of FM/TM Telem. Sys. Under Dynamic Conditions
490-02-01-21-00-9-004	RAS-171T	Launch Services, Wallops Island - FY69
490-02-01-23-00-9-004	RAS-172T	Launch Services, WTR - FY69
490-02-02-20-00-9-004	RAS-174T	Scout Supporting Activities - Production Services - FY69
490-02-00-14-00-9-004	RAS-175T	LRC Division Support of Scout Project - FY69
180-19-03-05-00-0-004	RAS-176T	Study Feas. of Reducing Control Sys. Thrust Levels
180-11-03-01-00-0-004	RAS-178T	Investigation of Large Heat Shield for Scout Vehicle
180-32-05-07-00-0-004	RAS-182T	Study Imp. Meths. Des. and Fab. Solid Fuel Rocket Motors
874-11-75-01-00-0-514	RAS-185	Goddard Requirement for German Satellite
711-02-10-01-00-0-004	RAS-301T	Dev. of New Payload Shroud for Scout Veh. & PAET Program
490-02-02-14-00-1-004	REY-362	Stability and Fin Loads Tests on Modified Scout Vehicle
180-32-51-07-00-0-004	TGD-108	Nozzle Material Evaluation

TABLE CLXXXIII - COMPLETED DOD SCOUT R AND D PROGRAM NUMBERS

	J.O.	JOB
490-07-11-11-00-2-924	RAS-200	FY62 Vehicles (Navy) - R62-7087 Transit Phase II
490-07-12-11-00-2-924	RAS-201	FY62 Veh. (Navy) - R62-7098 SOLRAD & AEC No. 1
490-07-00-06-00-2-934	RAS-202	Beanstalk 62-12 + 62-13
490-08-11-03-00-2-924	RAS-203	GSE Transit - R62-7086
490-07-00-02-00-7-934	RAS-204T	OAR Air Force Scout 62-6 Line 3
490-07-00-05-00-5-934	RAS-205	Blue Scout Jr. (Air Force) 62-14
490-08-02-03-00-2-924	RAS-206T	WTR (Navy) - R61-7154
490-08-22-03-00-6-934	RAS-207	Hawthorne (Air Force) 62-6 Line 8
490-08-02-03-00-3-934	RAS-207T	WTR (Air Force) 62-6 Line 5
490-07-00-01-00-1-934	RAS-208**	609A-690A Program 59-4+5+6, 62-6 Line 1
490-08-13-10-00-3-954	RAS-209	AEC Launching AT-495-2218
490-07-13-13-00-3-954	RAS-209T	FY63 AEC Vehicles AT-495-2218
490-07-14-04-00-3-954	RAS-209	AEC X-258 Cases 63-236
490-07-15-04-00-3-954	RAS-209	AEC X-248 Cases 63-485
490-07-16-04-00-3-954	RAS-209	Spin Motors and Igniters - AEC 63-589
490-07-17-04-00-3-954	RAS-209	Support - AEC 63-930
890-01-00-08-00-3-934	RAS-210	Air Force Development Funds 63-20
490-01-05-13-00-9-934	RAS-211	FY63 Vehicles (Navy) 63-29 Phases III and IV
490-07-20-13-00-3-934	RAS-212T	Air Force Special Program 63-32
490-08-21-13-00-3-934	RAS-213	FY63 Support 63-30
490-08-23-13-00-3-934	RAS-213	FY63 Support 63-27
490-08-24-13-00-6-934	RAS-214	MIPR 63-44 X-258 Air Force
490-08-27-04-00-6-934	RAS-216	MIPR 64-30 X-259 Motors
490-08-31-23-00-6-934	RAS-217	WTR GSE MIPR 65-42
490-08-32-04-00-5-924	RAS-218	X-259 Tooling for Navy R65-34-174
490-07-34-04-00-7-934	RAS-220	X-258 Motors for SATAR MIPR 66-87
490-01-36-07-00-1-924	RAS-222	SOLRAD Mission Requirements

**Replaces RAS-101.

TABLE CLXXXIV -AGENCYWIDE FUNDING CODE

1 2 3	4 5	6 7	8 9	10 11	12 13	14	15 16	17	18 19 20 21	22
Project	Division Breakdown	Project Requirements			Procurement	F. Y.	Funds	Type	Object	Operating Costs
Scout	SV	Payload & Site	Project & Program	Phase	Placement		Method of Finance	Fund Source	Class	
894 497 490	01...	01...	01...	00		9	00...	4...	2522	2
	4 - 5 *	6 - 7 **			S.B L.B. F.S. U.					

1 2 3	4 - 5 *	6 - 7 **	8 9
00		Inapplicable	Inapplicable
01	Hardware	ESRO-1B (Reimb.)	609A-690A (62-6 LINE 1)
		Vehicles, Field	
02	Supporting Activities	Services, Motors	(62-6 LINE 3)
		Production Support	
03	Product Improvement	Spares	GSE (R62-7086)(62-6 L 5)
		Logistics	
04	Trust Funds	Mission Mods(P/L's)	Motors, Phase IV
05		S-48(Procurement)	Blue Scout Jr. (62-14), Phase V
06 -		P21-21a	Beanstalk (62-12-13), up to Phase IX
07	Production	Mercury Scout	Payload, up to Phase IX
08	Sup. Ser.-Prof.	S-51, AEROS-B	Velocity Control (63-20), up to Phase IX
09	Sup. Serv.-Dev.	Reentry	Launcher & Pad
'0		San Marco	
11		Transit(R62-7087)	10-32 (FY62 Funds)
12		Solrad(R62-7098)	Sub-Payloads & Exper.
13		AEC (AT495-2218)	33-45 (FY-63 Funds)
14		S-52 - 52a	LRC - Tests
15		S-66 (BE)	Foreign Programs
16		S-53 (U.K.-X4)	Product Improvement
17		SERT	46-55 (FY64-65 Funds) IV
18		University	56-62 (FY66 Funds) IV
19		#Navy --63-29	Data & Communications
20		A.F. --63-32	Systems Engineering
21		A.F. --63-30	Maint.-GSE - W. I.
22		Hawthorne, Nev.	(62-6 LINE 8) Storage
23		A.F. --63-27	Maint.-GSE - WTR
24		A.F. --63-44	DCASO
25		Air Density/Injun	Exp. Spares & Logistics
26		France	Fifth Stage
27		A.F. --64-30	63-77 (FY67-68 Funds) V
28		S-55	78-92 (FY68-69 Funds) VI
29		ESRO	S.E.V.
30		RAM	Air Transportability
31		A.F. --65-42	Probes
32		Navy R65-34-174	AMR
33		#Navy --66-95	Wallops
34		A.F. --66-87	WTR
35		#Navy --68-F-0071	LRC
36		NRL-71F0921	JPL
37		UK (Reimb.)	93-107 (FY70-71 Funds)VII
90	Sustaining Engineering and Ma'ntenance		

15 16	Funds	17	Type	18 19 20 21	Object	22	Operating Costs
0 0	L.R.C.	Per. Serv.	1	Ammo. & Expl. 2605	1	R&D IN-H	
9 2	Navy	Travel	2	Missile & Aircrft. 2612	2	R&D O-H	
9 3	Air Force	Inst. Sup.	3	Electronic 2604	3	R&D Capital	
2 2	Lewis	R & D	4	Freight-Ground 2221	7	Capital - OH	
4 1	Marshall	C & F	5	Air Freight 2241	8	C-F Operating	
3 1	Goddard	A & E - E & F	6	Photographic 2614	9	C-F Capital	
3 5	MSC		7	R&D(Dev. & Test) 2511			
9 5	AEC	S & E	8	Service Contracts 2531			
9 8	Italy T.Fnd.	S of P - Prior Yrs	9	Eng. Services 2522			
				Maint.Rep.-Equip. 2542			
				Contract Admin. 2567			
				Space Vehicles 3111			
				Electrical 2541			
				Rigging 2588			
				Stock 2611			

---

*SV Office.
**Scout Office.
#A.F. Funds.

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

(d) Itemized in table CLXXXV are the contract, delivery, storage, and launch dates for each vehicle. The inventory of processed and checked out vehicles is shown in table CLXXXVI.

TABLE CLXXXV - DELIVERY AND LAUNCH DATES

VEHICLE NO.	DATES CONTRACTED	DATE ACCEPTED BY U.S. GOV'T.	DATE IN STORAGE	DATE DELIVERED	DATE LAUNCHED
S-138R	Aug. 60/Aug. 64	Jan. 1965	April 1965	May 1965	Nov. 1965
S-139R	Aug. 60/Aug. 65	Jan. 1965	Jan. 1965	Sept. 1965	Dec. 1965
S-140C	May 63/Aug. 65	June 1964	June 1964	Nov. 1965	Dec. 1965
S-141C	May 63/Aug. 65	April 1964	April 1964	Nov. 1965	Feb. 1966
S-142C	May 63/Aug. 65	May 1964	May 1964	Dec. 1965	Jan. 1966
S-143C	May 63/Aug. 65	June 1964	June 1964	Dec. 1965	Mar. 1966
S-144CR	May 63/Aug. 65/Nov. 68	June 1964	June 1964	Feb. 1966/Jan. 71	June 1971
S-145C	May 63/Aug. 65	June 1964	June 1964	Mar. 1966	Apr. 1966
S-146C	May 63/Aug. 65	July 1964	July' 1964	Mar. 1966	May 1966
S-147C	May 63/Aug. 65	Aug. 1964	Aug. 1964	April 1966	June 1966
S-148C	May 63/Aug. 65	Aug. 1964	Aug. 1964	May 1966	Aug. 1966
S-149C	May 63/Aug. 65	Aug. 1964	Aug. 1964	June 1966	Aug. 1966
S-150C	May 63/Aug. 65	Sept. 1964	Sept. 1964	July 1966	Oct. 1966
S-151C	May 63/Aug. 65	Sept. 1964	Sept. 1964	Aug. 1966	Jan. 1967
S-152C	May 63/Apr. 66	Sept. 1964	Sept. 1964	Aug. 1966	May 1967
S-153C	May 63/Apr. 66	Sept. 1964	Sept. 1964	Sept. 1966	Apr. 1967*
S-154C	May 63/Apr. 66	Oct. 1964	Oct. 1964	Jan. 1967	Apr. 1967
S-155C	May 63/Dec. 66	Oct. 1964	Oct. 1964	Dec. 1966	May 1967
S-156C	May 63/Dec. 66	Oct. 1964	Oct. 1964	Jan. 1967	May 1967
S-157C	May 63/Dec. 66	Nov. 1964	Nov. 1964	Apr. 1967	Sept. 1967
S-158C	May 63/Dec. 66	Nov. 1964	Nov. 1964	May 1967	Oct. 1967
S-159C	May 63/Dec. 66	Dec. 1964	Dec. 1964	June 1967	Oct. 1967
S-160C	May 63/Dec. 66	Dec. 1964	Dec. 1964	Nov. 1967	Mar. 1968
S-161C	May 63/Dec. 66	Dec. 1964	Dec. 1964	Mar. 1968	May 1968
S-162C	May 63/Dec. 66	Jan. 1965	Jan. 1965	Jan. 1968	Mar. 1968
S-163C	Aug. 66/Dec. 66	July 1967	July 1967	May 1968	Nov. 1971*
S-164C	Aug. 66/Dec. 66	Sept. 1967	Sept. 1967	Jan. 1968	Apr. 1968
S-165C	Aug. 66/Dec. 66	Nov. 1967	Nov. 1967	June 1968	Aug. 1968
S-166C	Aug. 66/Nov. 68	Nov. 1967	Nov. 1967	May 1970	Sept. 1971
S-167C	Aug. 66/Dec. 66	Dec. 1967	Dec. 1967	Aug. 1968	Oct. 1968
S-168C	Aug. 66/Dec. 66	Dec. 1967	Dec. 1967	July 1968	Aug. 1968
S-169C	Aug. 66/Dec. 66	Dec. 1967	Dec. 1967	Mar. 1969	Nov. 1969
S-170CR	Aug. 66/Nov. 68/S-9	Dec. 1967	Dec. 1967	Apr. 1969/June 72	Nov. 1972*
S-171C	Aug. 66/Nov. 68	Jan. 1968	Jan. 1968	Mar. 1970	Sept. 1970
S-172C	Aug. 66/Nov. 68	Jan. 1968	Jan. 1968	Aug. 1969	Oct. 1969
S-173C	Aug. 66/Nov. 68	Feb. 1968	Feb. 1968	July 1969	Apr. 1971*
S-174C	Aug. 66/Nov. 68	Feb. 1968	Feb. 1968	Nov. 1969	Nov. 1970
S-175C	Aug. 66/Nov. 68	Apr. 1968	Apr. 1968	Feb. 1970	Dec. 1970*
S-176C	Aug. 66/Nov. 68	July 1968	July 1968	June 1970	Aug. 1970
S-177C	Aug. 66/Nov. 68	July 1968	July 1968	June 1970	July 1971

---

*Launched from Kenya.

TABLE CLXXXV - SCOUT VEHICLE OPERATIONAL INVENTORY THROUGH PHASE V

FISCAL YEAR	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE
1961												
Inv.	1	0	1	1	1	1	1	1	0	0	1	1
Launch	1	0	0	1	0	1	0	1	0	0	0	1
New	0	1	0	1	0	1	0	0	0	1	0	1
1962												
Inv.	1	1	1	1	2	2	2	2	3	2	2	2
Launch	0	1	0	1	0	0	0	0	2	1	1	0
New	0	1	0	2	0	0	0	1	1	1	1	2
1963												
Inv.	4	6	6	8	9	9	7	8	6	7	5	4
Launch	0	2	0	0	0	2	0	1	0	2	1	2
New	2	2	2	1	0	0	1	(-1)	1	0	0	0
1964												
Inv.	2	1	1	0	0	0	1	1	1	0	2	2
Launch	1	0	1	0	0	1	0	0	1	0	0	2
New	0	0	0	0	0	2	0	0	0	2	0	1
1965												
Inv.	1	2	2	3	3	1	0	0	1	1	0	1
Launch	1	2	0	2	2	1	0	0	0	1	0	0
New	2	2	1	2	0	0	0	1	0	0	1	1
1966												
Inv.	2	2	1	2	2	3	3	2	2	3	3	3
Launch	0	1	0	0	1	2	1	1	1	1	1	1
New	0	0	1	0	2	2	0	1	2	1	1	1
1967												
Inv.	3	4	4	5	4	4	5	6	6	6	5	3
Launch	0	2	0	1	0	0	1	0	0	2	3	0
New	1	2	1	0	0	1	2	0	0	1	1	1
1968												
Inv.	4	4	4	3	2	3	2	4	3	2	1	1
Launch	0	0	1	1	0	1	0	0	2	1	1	0
New	0	0	0	0	1	0	2	(-1)	1	0	1	1
1969												
Inv.	2	3	2	2	1	1	1	1	1	2	3	3
Launch	0	2	0	1	0	0	0	0	0	0	0	0
New	1	1	0	0	0	0	0	0	1	1	0	0
1970												
Inv.	3	4	5	4	3	3	3	3	4	5	5	6
Launch	0	0	0	1	1	0	0	0	0	0	0	0
New	1	1	(-1)	0	1	0	0	1	1	0	1	2
*1971												
Inv.	8	8	7	6	6	6	5	5	5	5	4	4
Launch	0	1	1	0	1	1	0	0	0	1	0	1
New	0	0	0	0	1	0	0	0	0	0	0	1

(e) A Scout Program Review was held semiannually. The Scout Prime Contractor and the NASA Scout Project Office presented the program to top management of both NASA and the Prime Contractor (LTV). DOD representatives were also in attendance. Copies of a few of the slides from the September 18, 1969, meeting are reproduced here as typical information presented.

Figure 38 shows the Scout Processing Schedule as of September 18, 1969. Figure 39 shows the NAS1-7256 contract total manpower and dollar expenditures. Figures 40 and 41 show the LTV Logistics Organization. Figure 42 shows the Scout Field Operations. Table CLXXXVII shows the Scout Field Quality and Reliability Program. Figure 43 shows the status of the Standard Operating Procedures program on contract NAS1-6935. Figure 44 shows the LTV Scout organization at the time of this meeting.

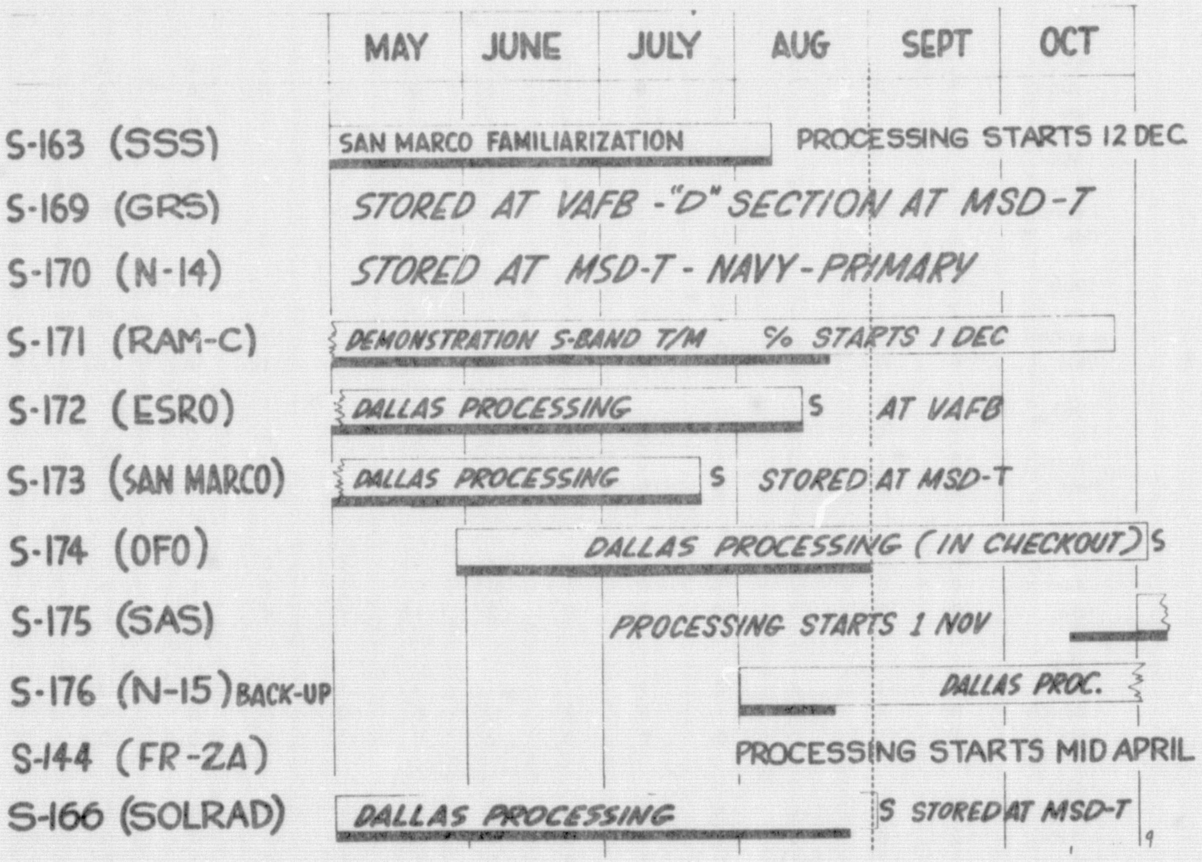


Figure 38.- Scout Processing Schedule as of September 18, 1969.

SCOUT SYSTEM MANAGEMENT

NASI-7256

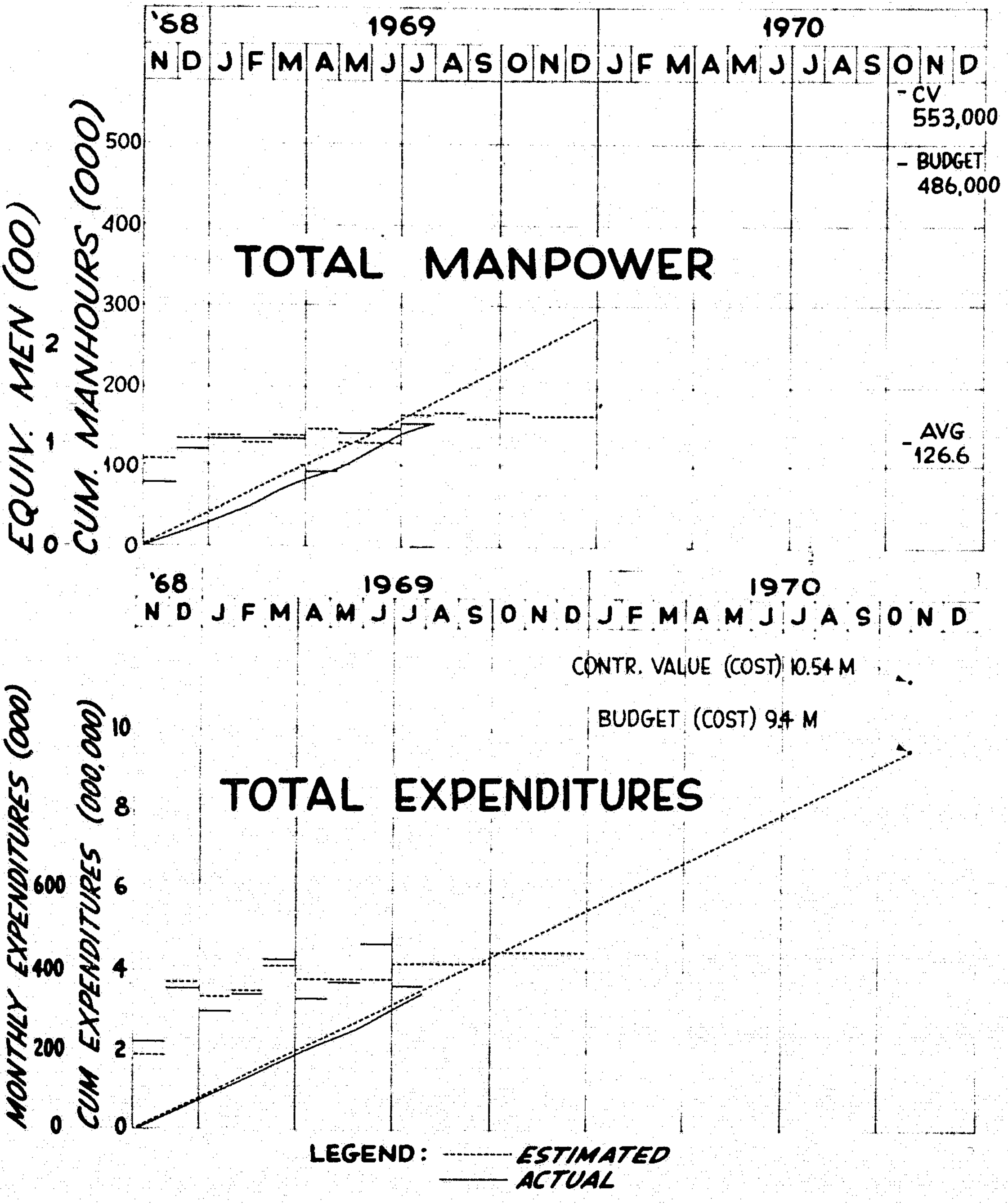
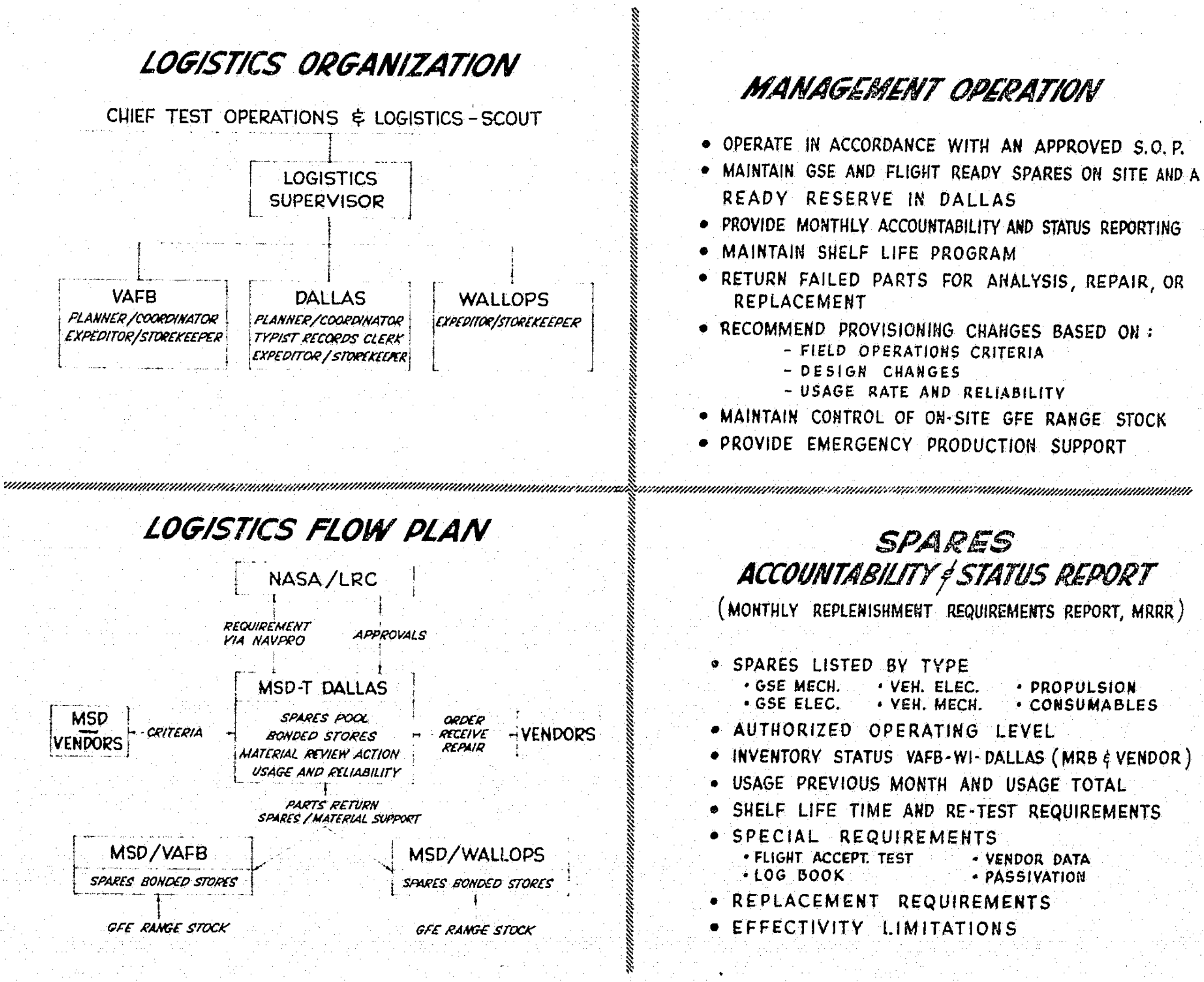


Figure 39.- NAS1-7256 contract total manpower and dollar expenditures.



LOGISTICS ORGANIZATION

CHIEF TEST OPERATIONS & LOGISTICS - SCOUT

LOGISTICS SUPERVISOR

VAFB
PLANNER/COORDINATOR
EXPEDITOR/STOREKEEPER

DALLAS
PLANNER/COORDINATOR
TYPIST RECORDS CLERK
EXPEDITOR/STOREKEEPER

WALLOPS
EXPEDITOR/STOREKEEPER

MANAGEMENT OPERATION

- OPERATE IN ACCORDANCE WITH AN APPROVED S.O.P.
- MAINTAIN GSE AND FLIGHT READY SPARES ON SITE AND A READY RESERVE IN DALLAS
- PROVIDE MONTHLY ACCOUNTABILITY AND STATUS REPORTING
- MAINTAIN SHELF LIFE PROGRAM
- RETURN FAILED PARTS FOR ANALYSIS, REPAIR, OR REPLACEMENT
- RECOMMEND PROVISIONING CHANGES BASED ON :
  - FIELD OPERATIONS CRITERIA
  - DESIGN CHANGES
  - USAGE RATE AND RELIABILITY
- MAINTAIN CONTROL OF ON-SITE GFE RANGE STOCK
- PROVIDE EMERGENCY PRODUCTION SUPPORT

LOGISTICS FLOW PLAN

NASA/LRC

REQUIREMENT VIA NAVPRO

APPROVALS

MSD-T DALLAS
SPARES POOL
BONDED STORES
MATERIAL REVIEW ACTION
USAGE AND RELIABILITY

MSD VENDORS

CRITERIA

ORDER RECEIVE REPAIR

VENDORS

PARTS RETURN
SPARES/MATERIAL SUPPORT

MSD/VAFB
SPARES BONDED STORES

GFE RANGE STOCK

MSD/WALLOPS
SPARES BONDED STORES

GFE RANGE STOCK

SPARES ACCOUNTABILITY & STATUS REPORT

(MONTHLY REPLENISHMENT REQUIREMENTS REPORT, MRRR)

- SPARES LISTED BY TYPE
  - GSE MECH.
  - GSE ELEC.
  - VEH. ELEC.
  - VEH. MECH.
  - PROPULSION
  - CONSUMABLES
- AUTHORIZED OPERATING LEVEL
- INVENTORY STATUS VAFB-WI-DALLAS (MRB & VENDOR)
- USAGE PREVIOUS MONTH AND USAGE TOTAL
- SHELF LIFE TIME AND RE-TEST REQUIREMENTS
- SPECIAL REQUIREMENTS
  - FLIGHT ACCEPT. TEST
  - LOG BOOK
  - VENDOR DATA
  - PASSIVATION
- REPLACEMENT REQUIREMENTS
- EFFECTIVITY LIMITATIONS

Figure 40.- LTV Logistics Organization.

LOGISTICS PROGRAM COSTS

	1962	1963	1964	1965	1966	1967	1968	1969	TOTAL
CONTRACTS	NAS1-1970	NAS1-2165	NAS1-2165, 3420	NAS1-2165, 3420	NAS1-4664	NAS1-6020	NAS1-6020	NAS1-7256	
SPARES	$410,000	$380,000	$532,000	$94,000	$335,000	$222,000	$335,000	$135,000	$2,443,000
REPAIR	–	12,000	44,000	46,000	57,000	61,000	104,000	63,000	387,000
TOTAL	$410,000	$392,000	$576,000	$140,000	$392,000	$283,000	$439,000	$198,000	$2,820,000

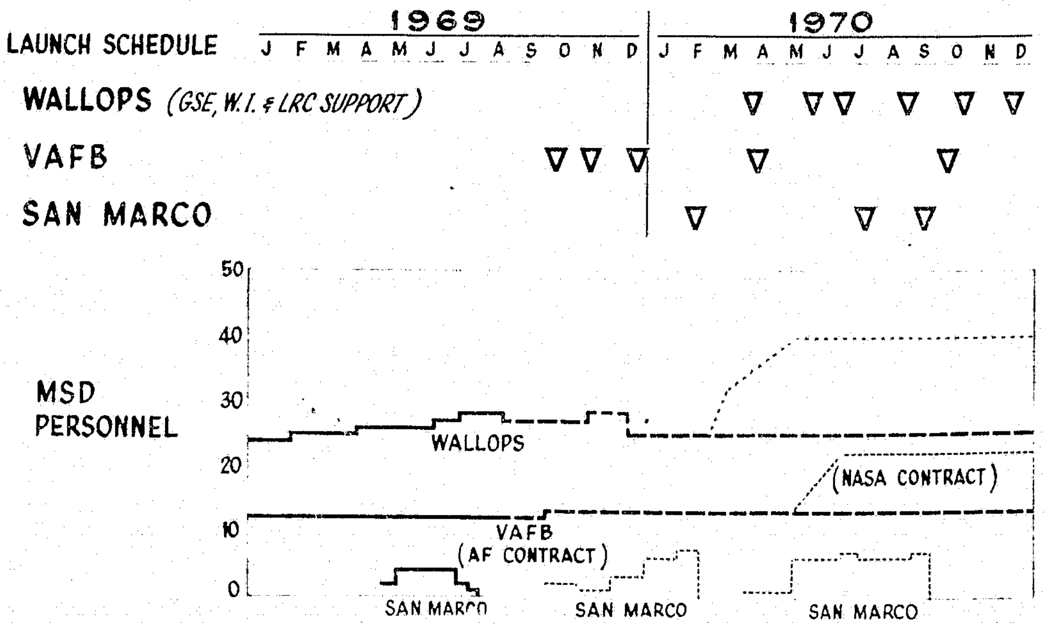
SPARES CURRENT INVENTORY - JULY '69

	LINE ITEMS	PIECES	VALUE
VEHICLE ELECTRICAL	134	511	$ 850,000
VEHICLE MECHANICAL	82	535	270,000
VEHICLE PYROTECHNICS	49	932	80,000
GSE ELECTRICAL	117	390	40,000
GSE MECHANICAL	197	862	230,000
CONSUMABLES	687	14,432	150,000
TOTAL	*1,266*	*17,662*	*$ 1,620,000*
MATERIAL ON ORDER (NOT RECEIVED IN STORES)			56,000
GRAND TOTAL			***$1,676,000***

Figure 41.- LTV Logistics Organization.

SCOUT FIELD OPERATIONS

LAUNCH AND MANPOWER PLANNING



SUPPORT SUMMARY

	VAFB		W. I.		TOTAL	
	LAUNCHES	MSD PERSONNEL	LAUNCHES	MSD PERSONNEL	LAUNCHES	MSD PERSONNEL
1964	5	18	5	62	10	80
1965	2	18.6	3	57.2	5	75.8
1966	7	21.9	2	44.8	9	66.7
1967	7	16.2	1	42.5	8	58.7
1968	4	13.0	3	40.7	7	53.7
1969		12.5		*24/8.0		

****24 PERMANENT AT WALLOPS, 8 DALLAS SUPPORT FOR PROCESSING EACH OF 3 VEHICLES IN A TWO YEAR SPAN.***

Figure 42.- Scout Field Operations.

TABLE CLXXXVII - SCOUT FIELD QUALITY & RELIABILITY PROGRAM.

FIELD QUALITY & RELIABILITY

CONTROL

- **QCEB - PP - 011**
  - **PURPOSE**
    - ESTABLISH Q.C. POLICIES AND PROCEDURES
  - **OBJECTIVES**
    - MONITORING AND DOCUMENTATION OF ALL TESTING
    - INSURE COMPLIANCE TO SCOUT CRITERIA
    - INSPECTION AND TESTING
    - PROVIDE Q.C. FIELD LIAISON WITH MSD-T
- **FIELD QUALITY CONTROL MANUAL**
  - **PURPOSE**
    - DEFINE Q.C. POLICY AND PROCEDURE REQUIREMENTS
  - **PROCEDURES**
    - CONFIGURATION CONTROL
    - INSPECTION AND CHECKOUT
    - CALIBRATION
    - NON - CONFORMING MATERIAL
    - DOCUMENTATION

LIAISON

- ***MEETINGS***
  - FIELD RELIABILITY & QUALITY MEETING
  - RELIABILITY & ENGINEERING REVIEW MEETING
  - PERIODIC FIELD VISITS
  - SPECIAL MEETING - INDOCTRINATION & FAMILIARIZATION
- ***REVIEWS***
  - FIELD LOGBOOK REVIEW
  - QCTIR REVIEW
  - CONFIGURATION CONTROL
- ***DOCUMENTATION EXCHANGE***
  - BI-MONTHLY REL. STATUS REPORT
  - VEHICLE END NARRATIVE REPORT
  - MALFUNCTION REPORTS
  - FAILED PARTS ANALYSIS REPORTS
- ***TRAINING AND CERTIFICATION***
  - ON-THE-JOB TRAINING
  - TRAINING AND CERTIFICATION
    - SOLDERING
    - ELECTRICAL CONNECTORS
    - H_2O_2 SERVICE
    - PNEUMATIC SERVICE

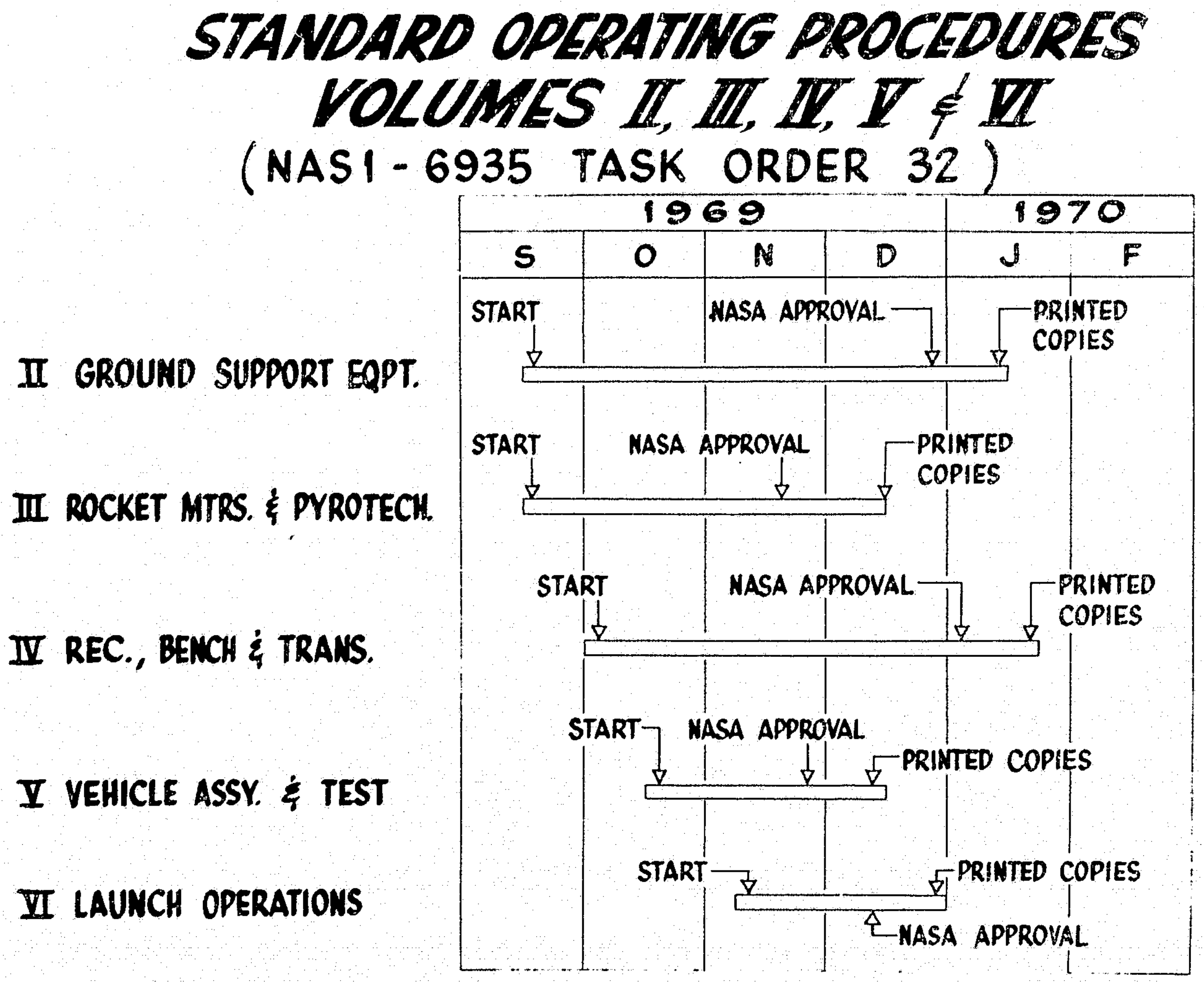


Figure 43.- Standard Operating Procedures, NAS1-6935.

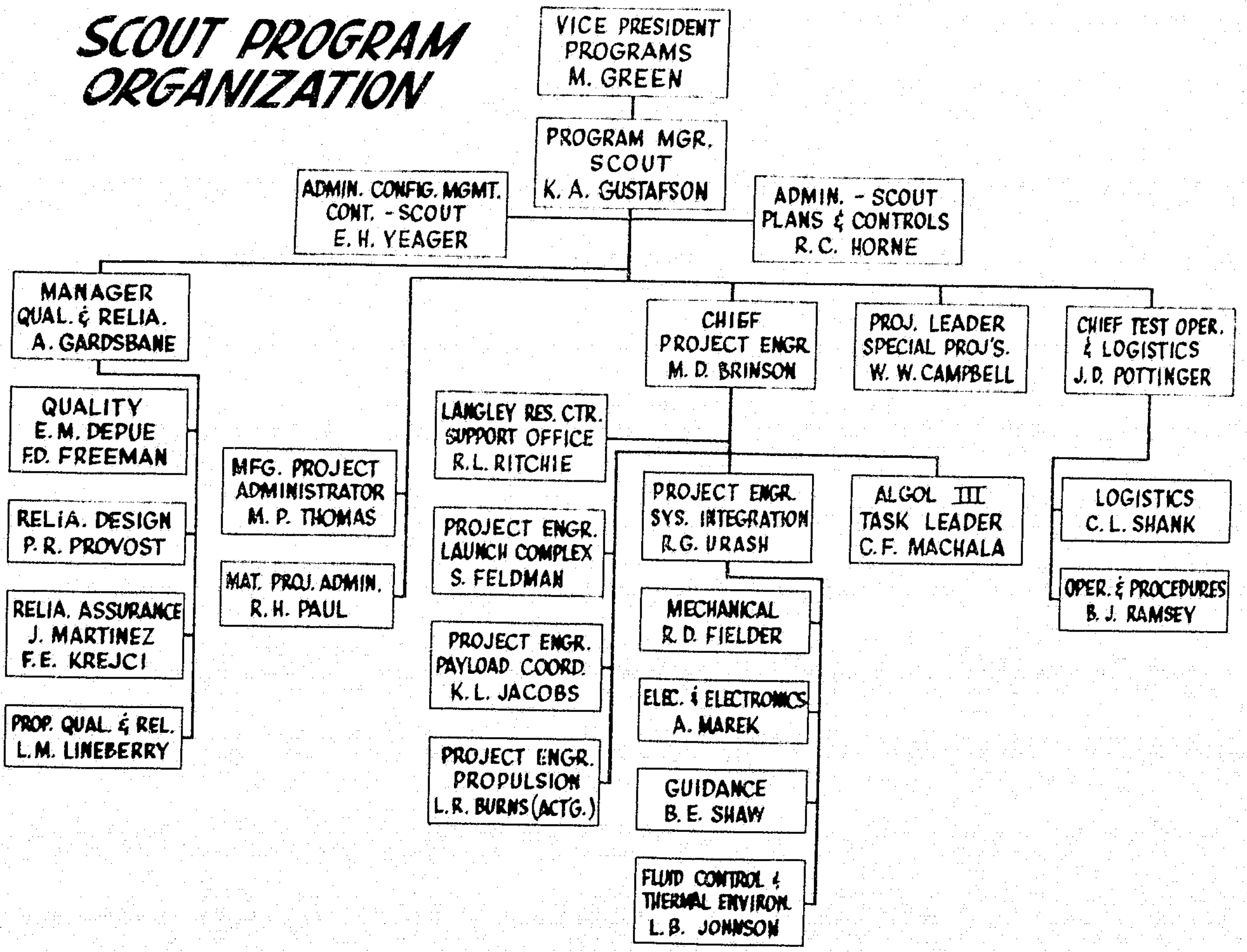


Figure 44.- LTV Scout Organization.
September 18, 1969

3. TECHNICAL INFORMATION

3. TECHNICAL INFORMATION

GENERAL DESCRIPTION

(a) The basic Scout space vehicle is a four-stage guided booster utilizing solid propellant rocket motors. A detailed description is presented in Langley WP-804. The Scout vehicle is equipped with a preprogramed guidance system where each expended stage of the Scout separates from the vehicle on a timed sequence. A general arrangement drawing of the Scout vehicle is shown in figure 45. Figure 45 also shows various station locations along the Scout vehicle. The major structure and rocket motor assemblies of the Scout vehicle are shown in figure 46. The payload is protected from the high temperatures during ascent by a two-piece heat shield which is ejected just prior to third-stage ignition.

Table CLXXXVIII lists the designations of the Scout configurations that were launched in Phases IV and V.

Excluding payload weight, typical Scouts A, B, and D vehicles had nominal total lift-off weights of 39,384.78 pounds, 39,615.22 pounds, and 46,987.71 pounds, respectively. The nominal weight summaries for these three Scout configurations are shown in table in table CLXXXIX. The weights were used to compute the guidance program incorporated in each launch vehicle. A detailed weight breakdown of a typical Scout vehicle is presented in appendix C.

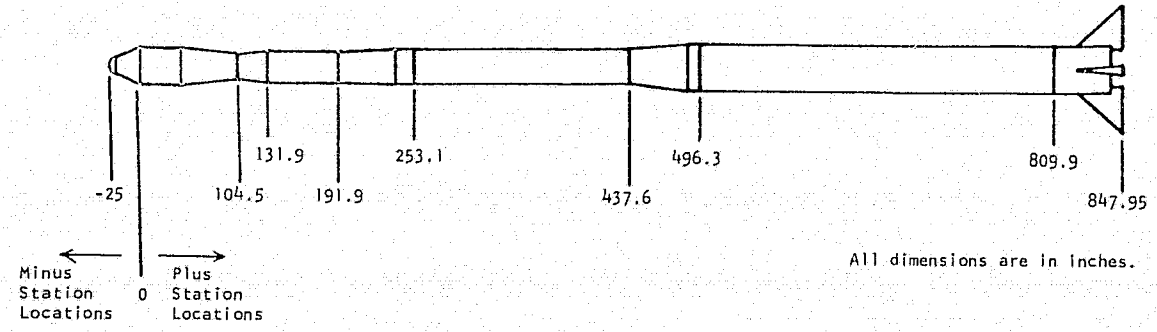


Figure 45.- Various Station Locations Along the Scout Vehicle.

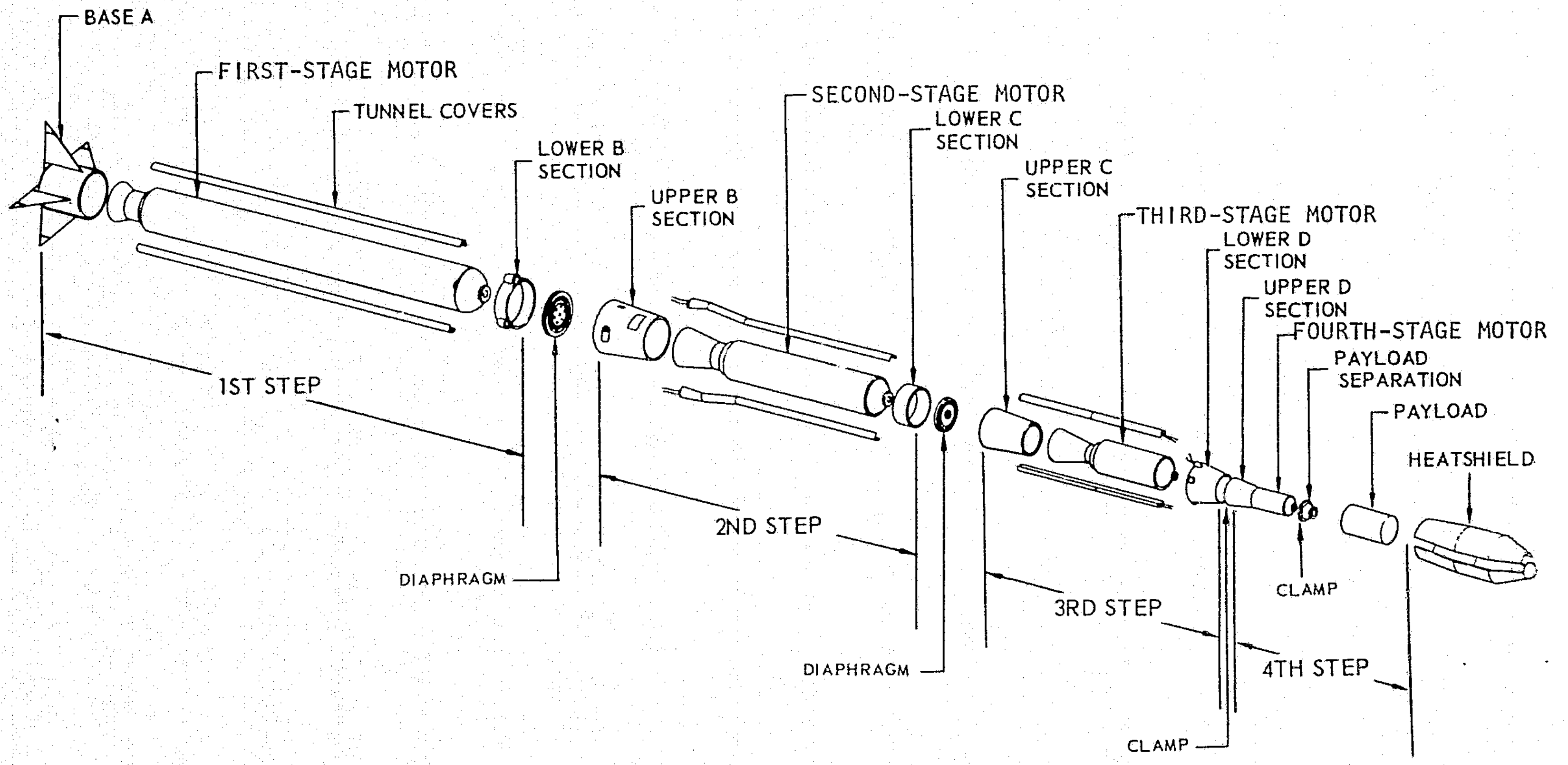


Figure 46.- Scout-B vehicle - exploded view.

TABLE CLXXXVIII - DESIGNATION OF SCOUT CONFIGURATIONS.

CONFIGURATION	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE	QUANTITY LAUNCHED
X-4	Algol IIA	Castor IA	Antares IIA	Altair IIA	None	
X-4A	Algol IIA	Castor IA	Antares IIA	Altair IIA	NOTS-17	
X-5C	Algol IIA	Castor IIA	Antares IIA	None	None	
A	Algol IIA	Castor IIA	Antares IIA	Altair IIA	None	
B	Algol IIA	Castor IIA	Antares IIA	Altair IIIA	None	
*C	Algol IIA	Castor IIA	Antares IIA	Altair IIIA	BE-3	
**D-1	Algol IIIA	Castor IIA	Antares IIA	Altair IIIA	None	

OTHER REFERENCE DESIGNATIONS:

Algol II-45KS-100,000
Algol III-Under development

Castor II-TX354-3

Antares II-X259, 33DS-21,540

Altair II-X258, XM-94, 24DS-5850
Altair III-FW4S, XSR-57-UT-1

BE-3, 9.15-DS-5770

*Sunblazer Program canceled.
**Developed for Phase VII and launched on the last Phase V vehicle after the period covered in this report.

TABLE CLXXXIX - NOMINAL WEIGHT SUMMARIES FOR SCOUTS A, B, AND D.

STAGE WEIGHT (LESS PAYLOAD)	SCOUT A		SCOUT B		SCOUT D	
	POUNDS	STAGE WEIGHT	POUNDS	STAGE WEIGHT	POUNDS	STAGE WEIGHT
Payload	0.00	0.00	0.00	0.00	0.00	0.00
Fourth Step - Inert	81.14		69.84		68.96	
Fourth-Stage Burnout	81.14		69.84		68.96	
Fourth Stage - Consumer	510.25		610.89		611.34	
Fourth-Stage Ignition	591.39	591.39	680.73	680.73	680.30	680.30
Third Step - Inert	764.80		763.10		753.65	
Third-Stage Burnout	1,356.19		1,443.83		1,433.95	
Third Stage - Consumed	2,602.91		2,603.80		2,604.54	
Third-Stage Ignition	3,959.10	3,367.71	4,051.21	3,370.48	4,038.49	3,358.19
Second Step - Inert (Includes Heat Shield)	2,369.26		2,351.07		2,429.94	
Second-Stage Burnout	6,328.36		6,402.28		6,466.43	
Second Stage - Consumed	8,298.28		8,262.91		8,304.98	
Second-Stage Ignition	14,626.64	10,667.54	14,702.69	10,651.48	14,771.41	10,734.92
First Step - Inert	3,393.04		3,528.53		4,284.30	
First-Stage Burnout	18,019.68		18,231.07		19,055.71	
First Stage - Consumed	21,365.10		21,384.15		27,932.00	
First-Stage Ignition	39,384.78	24,758.14	39,615.22	24,912.53	46,987.71	32,216.30
TOTAL LAUNCH WEIGHT (LESS PAYLOAD)		39,384.78		39,615.22		46,987.71

The stage weights shown include those parts of the transition sections which remain attached to the stage upon separation from the previous stage. The consumed weights shown for the second and third stages include nominal amounts of hydrogen peroxide used by the reaction control system. Payload attachments, instrumentation, and a separation system (if one is used) are considered to be included in the payload weight. The Scout stages consisted of the following.

SCOUT A, B, & D

Stage	Assembly
1	Base Section A (includes fins and jet vanes) Algol IIB rocket motor (A and B) Algol III (D) Transition B-Lower (includes blowout diaphragm)
2	Transition B-Upper Castor II TX-354 rocket motor Transition C-Lower (includes blowout diaphragm)
3	Transition C-Upper Antares II X-259 rocket motor Transition D-Lower Transition D-Center (includes spin bearing and separation system)
4	Transition D-Upper Altair II X-258 rocket motor (Scout A) or Altair III FW4S rocket motor (Scout B) Heat Shield Transition E (includes cold separation system)
5	Payload Assembly (may be used as part of fourth stage)

(b) Heat Shield. The heat shield covers the payload, fourth-stage motor, and upper-D section, and is designed to maintain the enclosed components within specified temperature limits. The Scout vehicle has used heat shields having a diameter of 20 inches, 21.5 inches, 25.7 inches, 34 inches, and 42 inches, with only the 34-inch and 42-inch diameter heat shields planned for Phase VI. Heat shields are fabricated from two fiberglass honeycomb half shells. The 34-inch diameter heat shield has a stainless steel nose cap and the 42-inch diameter heat shield has a cork-covered aluminum nose cap. The nose cap attaches to one half shell and butts against the other half shell. The 34-inch heat shield has a body section outside diameter of 34 inches, tapers to 25.7 inches at the aft end and extends to forward nose station -25 or -40. A 22-degree conical section supports the 7.71-inch radius nose cap. The 42-inch heat shield has a body section outside diameter of 42 inches, tapers to 28.2 inches

at the aft end and extends forward to nose station -45. A 12.5-degree conical section supports a 12.28-inch spherical nose cap. Figure 47 illustrates the comparison of the 34-inch and 42-inch heat shields. Figure 48 shows a typical heat shield and the heat shield history to date.

(c) Vehicle Improvements. As a result of a continuing reliability program, the following items were developed and introduced into the Scout system.

PHASE IV:

Inverters
Improved NDT and Fabrication Procedures of Algol Nozzles
Armalon Barriers on Reaction Jets
Improved X-259 Motor Bond System
Improved Control System Components
Improved Ignition System and Components
Pressure Transducers
Factory-Sealed Base-A Hydraulic System
Revised Jet Vane Design
Blast Shields - Autodestruct
Boundary Layer Seals
Third-Stage Motor Nozzle Insulation
Improved Algol Nozzle
Environmental Requalification
Reliability Improvements to X-258 Motor
Redesign Spin Motors
Payload Separation Timers
Headcap Transducer
New Safe Arm Units
Standard Operating Procedures
Standard Scout System Tests
Configuration Control
Standard Launch Complex
Improved FW-4S Motor Nozzle

PHASE V:

Electro-Hydraulic Servo Actuator
Improved N_2 Relief Valve
500-Pound Motor Valve Filter
Commutator IRIG Standard Frequency
Improved H_2O_2 Relief Valve
Additional Intervalometer Channels
Improved Rate Gyros
Modification to 14, 40 and 48-Pound Motor Valves
Modification to 2-Pound Motor Valve
New Quick Disconnects
Power Switching Relay - T/M and Beacon
37-Volt Guidance Battery

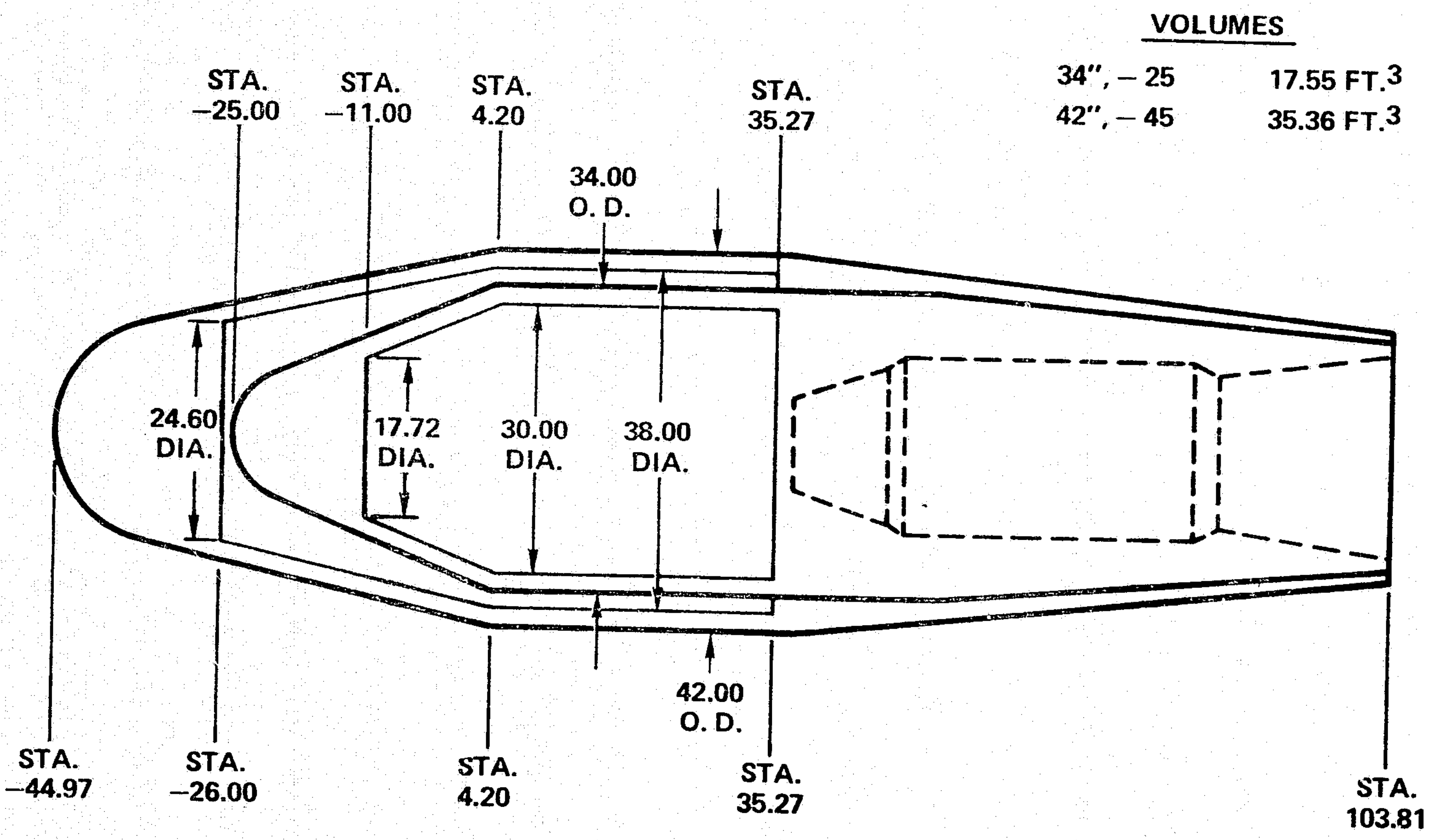
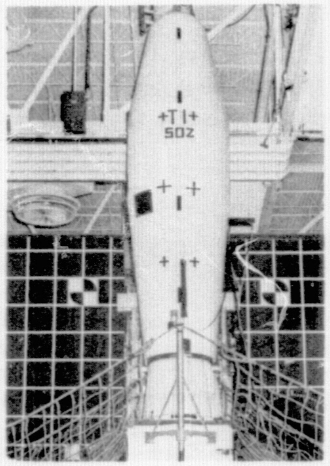


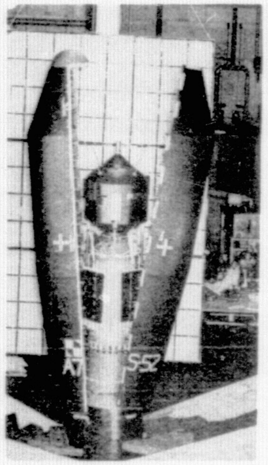
Figure 47.- Scout Heat Shield Comparison.

Vehicle	Serial Number	Style	Diameter (Inches)	Length (Inches)	Forward Station (Inches)
X		A	20	98.5	+4.8
ST-1		A	20	98.5	+4.8
ST-2		A	20	98.5	+4.8
ST-3		A	20	98.5	+4.8
ST-4		A	20.7	98.5	+4.8
ST-5		C	25.7	90.7	+13
ST-6		B	25.7	98.7	+5
ST-7		D	21.5	113.7	-10
ST-8		D	21.5	113.7	-10
ST-9		D	21.5	113.7	-10
110	114	G	34	128.7	-25
111	111	E	34	113.7	-10
112	112	F	25.7	108.7	-5
113	A-4	G	34	128.7	-25
114	110	H	25.7	118.7	-15
115	113	E	34	113.7	-10
116	A-5	G	34	128.7	-25
117	117	F	25.7	108.7	-5
118	116	G	34	128.7	-25
119	A-1	G	34	128.7	-25
120	A-3	G	34	128.7	-25
121	121	F	25.7	108.7	-5
122R	A-13	G	34	128.7	-25
123RR	A-2	G	34	128.7	-25
124R	129	E	34	113.7	-10
125R	A-8	G	34	128.7	-25
126	126	F	25.7	108.7	-5
127R	A-7	G	34	128.7	-25
128R	A-11	G	34	128.7	-25
129R	A-6	G	34	128.7	-25
130R	A-12	G	34	128.7	-25
131R	A-27	G	34	128.7	-25
132	C-1	I	25.7	113.7	-10
133R	124	E	34	113.7	-10
134R	A-9	G	34	128.7	-25
135R	A-21	G	34	128.7	-25
136R	A-23	G	34	128.7	-25
137R	A-15	G	34	128.7	-25
138R	A-26	G	34	128.7	-25
139R	A-28	G	34	128.7	-25
140C	A-14	G	34	128.7	-25
141C	A-24	G	34	128.7	-25
142C	A-22	G	34	128.7	-25

NOTE: Base of H/S at Veh. Sta. 103.69.



Fit and ejection drop test (zero G) of 42-inch diameter heat shield.



Fit and ejection test without drop test (zero G) of Scout heat shield No. A-7 (34-inch diameter) and S-52 payload.

Vehicle	Serial Number	Style	Diameter (Inches)	Length (Inches)	Forward Station (Inches)
143C	A-31	G	34	128.7	-25
144C	A-502	K	42	148.7	-45
145C	A-29	G	34	128.7	-25
146C	A-32	G	34	128.7	-25
147C	A-30	G	34	128.7	-25
148C	A-33	G	34	128.7	-25
149C	A-34	G	34	128.7	-25
150C	A-35	G	34	128.7	-25
151C	A-36	G	34	128.7	-25
152C	A-37	G	34	128.7	-25
153C	A-43	G	34	128.7	-25
154C	A-37	G	34	128.7	-25
155C	A-41	G	34	128.7	-25
156C	A-39	G	34	128.7	-25
157C	A-42R	G	34	128.7	-25
158C	A-38	G	34	128.7	-25
159C	A-25	G	34	128.7	-25
160C	A-46	G	34	128.7	-25
161C	A-49	G	34	128.7	-25
162C	A-44	G	34	128.7	-25
163CR	A-400	J	34	128.7	-40
164C	None	-	-	-	-
165C	A-47	G	34	128.7	-25
166C	A-58	G	34	128.7	-25
167C	A-45	G	34	128.7	-25
168C	A-48	G	34	128.7	-25
169C	A-53	G	34	128.7	-25
170C	A-401	J	34	128.7	-40
171C	A-62	G	34	128.7	-25
172C	A-56	G	34	128.7	-25
173C	A-54	G	34	128.7	-25
174C	A-57	G	34	128.7	-25
175C	A-61	G	34	128.7	-25
176C	A-55	G	34	128.7	-25

SCOUT HEAT SHIELDS

	Diameter	Forward Station		Diameter	Forward Station
A -	20"	+4.8	F -	25.7"	-5
B -	25.7"	+5	G -	34"	-25
C -	25.7"	+13	H -	25.7"	-15
D -	21.5	-10	I -	25.7"	-10
E -	34"	-10	J -	34"	-40

Figure 48.- Scout Heat Shield Data.

Electrical Connectors
Lightweight Radar Beacon Installation
Improved Telemetry Antenna System
Head Cap Pressure Transducer
Auto Destruct Module Installation
Solid State Telemetry Transmitter
Installation of Motorola MCR-151 Command Destruct Receiver
New Instrumentation Accelerometers - Lower "D" Section
Tunnel Supports
Cast Fin Tip
Clamp Fitting
Longeron Modification
Upper "D" Attachments
Forward Ring - Upper "D" Section
Spin Disconnect Base
Heat Shield Hook Latch
"B" Section N_2 Manifold Fitting
Skin Attachments - Upper "C" Section
Isolation of 400 HZ
100 MV SCO
Yaw Torquing Capability
Power Switching Relays

GROUND SUPPORT EQUIPMENT MODIFICATIONS AND MATERIAL REQUIREMENTS

Power Transfer Switch Modification
Intervalometer Channel Additions
Connector Changes
Auto Destruct Module Incorporation
28V Command Destruct Receiver & Telemetry
Radar Beacon Power Incorporation
Launcher Beam Buildup

(d) Vehicle Presentation. In 1966 a Scout dummy vehicle was assembled from spare and test parts and presented to the Hampton Space Park, Hampton, Virginia (figure 49).

(e) Table CXC illustrates the summary of boost trajectory performance for the Phase IV and Phase V vehicles. This information is not available on vehicles S-152 and S-153 due to failure during flight.

Figure 50 shows Scout S-138, the first vehicle in phase IV, as it is readied for launch.

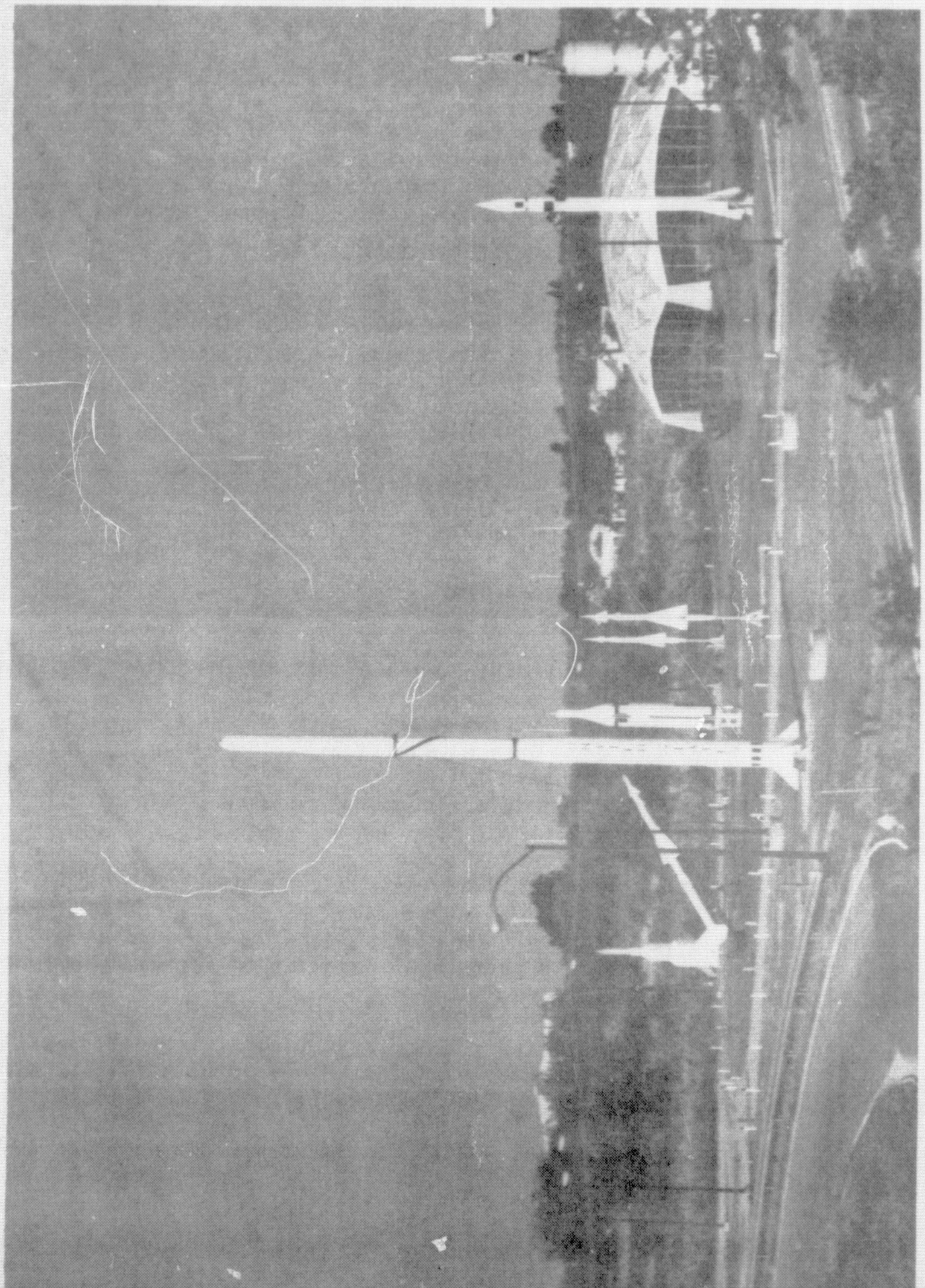


Figure 49.- Scout vehicle presented to the Hampton Space Park.

TABLE CXC

SCOUT S-138
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	79.56 (Stage 2 Ignition)	+1600	-3	+0.36	-0.91	The higher thrust level of the first-stage motor contributed about 50% of the altitude deviation and the path angle deviation. The effects of winds and pitch-up disturbances on path angle were compensating. The right quartering wind during boost produced about 60% of the azimuth deviation and the remainder is attributed to roll and yaw disturbances.
2 Boost	132.33 (Stage 3 Ignition)	+3600	-39	+0.51	-0.49	Altitude and path angle deviations increased because of a pitch-up thrust misalignment. Lower motor performance increased the velocity deviation. A predominately yaw-right thrust misalignment contributed to the decrease in azimuth deviation but the primary cause for this decrease was the effect of propagating an angular error at ignition through a boost phase.
3 Boost	180.0 (After Stage 3 Burnout)	+6100	+16	-0.18	-0.82	The altitude deviation increased because of the higher path angle at ignition, even though a pitch-down thrust misalignment changed the path angle deviation from high to low during boost. Higher motor performance resulted in a velocity gain. The azimuth deviation increased because of a yaw-left thrust misalignment.
3 Coast	626.73 (Stage 4 Ignition)	+10,300	+12	-0.01	-0.65	Deviations at third-stage burnout were propagated to fourth-stage ignition. A yaw-torquing maneuver was executed prior to ignition.
4 Boost	Injection **	+3.1 n.mi.	-109	+0.02	-0.54	The velocity loss is attributed to lower fourth-stage motor performance. The increase in altitude resulted from a small pitch-up disturbance at ignition and/or during boost. The expected decrease in azimuth deviation that would have occurred when the error at ignition was propagated to injection was offset in part by a yaw-left disturbance at ignition and/or during boost.

* Unless otherwise specified.

** Inertial value deviations are given.

TABLE CXC Continued

SCOUT S-139
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	79.45 (Stage 2 Ignition)	+2815	-46	+1.00	-0.14	Higher first-stage motor thrust level caused more than half of the altitude deviation and contributed to the path angle deviation. Pitch-up disturbances after 30 seconds flight time caused most of the path angle deviation and the remainder of the altitude deviation. Lower motor performance and gravity losses due to the higher path angle resulted in a velocity loss. The azimuth deviation is attributed to wind effects.
2 Boost	130.69 (Stage 3 Ignition)	+6155	-19	+0.94	+0.09	The path angle deviation was maintained because of a pitch-up thrust misalignment and as a result, the altitude deviation increased. Higher motor performance resulted in a decrease in the velocity deviation. The change in azimuth deviation from left to right of predicted was caused by a yaw-right thrust misalignment.
3 Boost	170.0 (After Stage 3 Burnout)	+14,575	-6	+0.09	-0.08	Most of the increase in altitude deviation was the result of the high path angle at ignition; the remainder was caused by higher thrust level. Higher motor performance decreased the velocity deviation. A pitch-down thrust misalignment contributed about 30% of the decrease in path angle deviation; most of this decrease resulted when the ignition deviation was propagated through the boost phase. As a result of a predominately yaw-left thrust misalignment, the azimuth deviation shifted from right to left of predicted.
3 Coast	624.1 (Stage 4 Ignition)	+8.0 n.mi.	-87	N/A	N/A	Deviations at third-stage burnout were propagated through the long coast period to fourth-stage ignition. The velocity loss was the result of velocity-altitude trade off.
4 Boost	Injection **	+8.9 n.mi.	-29	+0.05	+0.19	Higher motor performance decreased the velocity deviation. The shift in azimuth deviation from left at third-stage burnout to right at injection is attributed to yaw-right disturbances at fourth-stage ignition and/or during boost. It was determined that a small pitch-down disturbance was required to simulate the decrease in path angle deviation.

* Unless otherwise specified.
** Inertial value deviations given.

TABLE CXC Continued

SCOUT S-140C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	CONCLUSIONS (Determined during post-flight analysis)
1 Boost	79.06 (Stage 2 Ignition)	+170	+19	+1.34	+0.17	The path angle deviation resulted from the combined effects of winds and pitch-up disturbances after 30 seconds flight time, with the largest contribution from the pitch-up disturbances. No significant altitude deviation was incurred as a result of the high path angle because the thrust level of the first-stage motor was lower through most of the boost phase. The velocity gain was attributed to higher total motor performance. Winds were right-quartering, in a direction to produce an azimuth deviation to the left at stage burnout; thus there occurred an unexplained yaw-right disturbance that counteracted this effect and produced an azimuth deviation to the right.
2 Boost	123.26 (Stage 3 Ignition)	+1080	+4	+0.74	-0.49	About half of the path angle deviation is attributed to a pitch-up thrust misalignment and the remainder was propagated from the first-stage. The altitude deviation increased because of the higher path angle. Lower motor performance resulted in a velocity loss and a yaw-left thrust misalignment changed the azimuth deviation from right to left of predicted.
3 Boost	165.0 (After Stage 3 Burnout)	-4080	+5	-0.23	-0.72	The altitude loss during third-stage boost resulted primarily from the lower thrust level of the third-stage motor. Web burn time was about 2 seconds longer than predicted. A pitch-down thrust misalignment changed the path angle deviation from high to low while a yaw-left thrust misalignment increased the azimuth deviation.
3 Coast	694.59 (Stage 4 Ignition)	+0.1 n.mi.	+7	+0.10	-0.72	Third-stage burnout errors were propagated to fourth-stage ignition.
4 Boost	Injection **	-0.2 n.mi.	+67	-0.37	-0.91	The increase in velocity deviation is attributed primarily to higher motor performance. All of the change in path angle deviation and about half of the increase in azimuth deviation are attributed to pitch-down and yaw-left disturbances at fourth-stage ignition and/or during boost.

* Unless otherwise specified.
** Inertial value deviations are given.

TABLE CXC Continued

SCOUT S-141C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

(FIVE-STAGE RE-ENTRY)

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	83.74 (Stage 2 Ignition)	+860	-26	+0.29	-1.20	The altitude and path angle deviations resulted from higher thrust level and a pitch-up disturbance after 30 seconds flight time. Lower motor performance resulted in a velocity loss and yaw-left disturbances during the entire boost phase caused the deviation in azimuth.
2 Boost	130.0 (After Stage 2 Burnout)	+3310	-73	+0.83	-0.71	A pitch-up thrust misalignment increased the path angle and altitude deviations. Lower motor performance increased the velocity deviation. Yaw-left thrust misalignment occurred during boost but the azimuth deviation decreased as the ignition error was propagated through boost.
2 Coast	271.07 (Stage 3 Ignition)	+17,300	-113	+0.57	-0.69	Deviations at second-stage burnout were propagated to third-stage ignition. Because of the high burnout path angle, the altitude deviation increased and the path angle deviation decreased. A velocity loss was incurred as a result of velocity-altitude trade-off.
3 Boost	327.19 (Stage 4 Ignition)	+15,900	-47	-0.83	-0.62	A pitch-down thrust misalignment decreased the altitude deviation and shifted the path angle deviation from high to low. A yaw-left thrust misalignment maintained the azimuth deviation at stage 3 ignition through the boost phase. As a result of higher motor performance, the velocity deviation decreased.
4 Boost	352.14 (Stage 5 Ignition)	+5190	-7	-0.87	-0.22	The decrease in altitude deviation resulted from the low path angle at ignition. The increase in path angle deviation and 30% of the decrease in azimuth deviation are attributed to pitch-down and yaw-right distrubances at stage 4 ignition and/or during stage 4 boost.
5 Boost	396.81 (Stage 5 Burnout)	-13,500	-34	-0.98	+0.50	Stage 5 burnout was predicted to occur at 394.32 seconds, about 2.5 seconds earlier than the time indicated by telemetry data. About -10,000 ft of the altitude deviation shown results from the difference in burnout times. The altitude deviation was below predicted at burnout because of the low ignition path angle. The increase in velocity deviation is attributed to lower motor performance. The increase in path angle deviation and shift from left to right of the azimuth deviation are attributed to pitch-down and yaw-right disturbances at ignition and/or during boost.

TABLE CXC Continued

SCOUT S-142C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	79.0 (Stage 2 Ignition)	+3540	-11	+0.76	0	Most of the altitude deviation and about half of the path angle deviation are attributed to higher thrust level. The remainder of the path angle deviation is attributed to pitch-up disturbances after 20 seconds flight time. Winds were in a direction to produce an azimuth deviation of about -0.85 deg but this error was compensated by yaw-right disturbance.
2 Boost	122.87 (Stage 3 Ignition)	+6610	-21	+0.48	+0.02	The altitude deviation increased because of the high path angle at ignition and a pitch-up thrust misalignment. About half of the path angle deviation at stage 3 ignition resulted from this pitch-up thrust misalignment. The velocity deviation increased because of lower motor performance. A predominately yaw-right thrust misalignment occurred but this error compensated yaw-left, roll-yaw coupling effects propagated from the first stage and essentially no azimuth deviation remained.
3 Boost	160.0 (After Stage 3 Burnout)	+6000	+66	-0.13	-0.41	Pitch-down thrust misalignment shifted the path angle deviation from high to low and decreased the altitude deviation. Higher motor performance resulted in a velocity gain and a yaw-left thrust misalignment, combined with roll-yaw coupling effects propagated from the first stage, produced a yaw-left azimuth deviation.
3 Coast	681.92 (Stage 4 Ignition)	+26,800	+52	+0.28	-0.37	Deviations at third-stage burnout were propagated to fourth-stage ignition. Because of the higher velocity at burnout, the path angle deviation changed from low to high and the altitude deviation increased as a result. A velocity loss was incurred because of velocity-altitude trade-off.
4 Boost	Injection **	+24,900	+143	-0.86	-0.29	The decrease in altitude deviation and change in path angle deviation is attributed to a pitch-down disturbance at ignition and/or during boost. The increase in velocity deviation resulted from higher motor performance while the decrease in azimuth deviation resulted when the error at ignition was propagated through the boost phase.

* Unless otherwise specified.
** Inertial value deviation given.

TABLE CXC Continued

SCOUT S-143C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	79.12 (Stage 2 Ignition)	+3145	-5	+0.74	-0.52	The altitude gain and about 45% of the path angle deviation were caused by higher-than-predicted thrust level of the first-stage motor. The remaining portion of the path angle deviation is attributed to winds (tailwind component below 35,000 ft altitude) and pitch-up disturbances after 30 seconds flight time. The velocity loss resulted from the higher path angle. About 50% of the azimuth error was caused by winds (right cross wind above 40,000 ft altitude) and roll and yaw disturbances.
2 Boost	123.19 (Stage 3 Ignition)	+4210	-14	+0.39	-0.54	The altitude deviation increased because of the higher path angle at injection and a pitch-up thrust misalignment that contributed about half of the total path angle deviation at stage 3 ignition. The decrease in path angle deviation occurred as the result of propagation of the first-stage deviation through second-stage boost. Yaw thrust misalignment was predominately to the left, and combined with first-stage roll-yaw coupling to maintain the azimuth deviation.
3 Boost	158.0 (After Stage 3 Burnout)	+5755	+70	-0.42	-0.74	Higher initial path angle and higher thrust level increased the altitude deviation although a pitch-down thrust misalignment changed the path angle deviation from high to low. A velocity gain resulted from higher motor performance and an increase in azimuth deviation resulted from a yaw-left thrust misalignment.
3 Coast	679.18 (Stage 4 Ignition)	+3.4 n.mi.	N/A	N/A	-0.65	Deviations at third-stage burnout were propagated to fourth-stage ignition. Altitude increased because of the higher velocity at third-stage burnout.
4 Boost	Injection **	+3.5 n.mi.	+110	+0.11	-0.30	Higher motor performance resulted in a velocity gain during fourth-stage boost. The shift from lower-than-predicted path angle at third-stage burnout to higher-than-predicted at injection is attributed to a pitch-up disturbance at fourth-stage ignition and/or during boost. Most of the decrease in azimuth deviation occurs as a result of the error at ignition being propagated through the boost phase.

* Unless otherwise specified.

** Inertial value deviation given; predicted trajectory includes effects of lift-off weights.

TABLE CXC Continued

SCOUT S-144CR
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	75.10 (Stage 2 Ignition)	+5,664	+69	+0.50	+0.07	Motor total impulse was slightly lower than predicted but thrust was higher than predicted. Velocity deviation resulted from an improved drag prediction. Altitude and path angle deviations resulted from the high thrust and the revised drag prediction.
2 Boost	122.00 (After Stage 2 Burnout)	+19,534	+33	+1.17	-0.75	Motor performance was lower than predicted. Altitude and path angle deviations are attributed to pitch-up disturbances and higher-than-predicted thrust. Velocity deviation is attributed to low total impulse; azimuth deviation is attributed to roll and yaw disturbances.
2 Coast	412.13 (Stage 3 Ignition)	+61,245	-165	+0.96	-0.69	Altitude and path angle deviations are attributed to the propagation effects of high altitude, velocity and path angle at second-stage burnout.
3 Boost	488.20 (Stage 4 Ignition)	+59,806	-124	-0.65	-1.00	Motor performance was higher than predicted; offsetting effects caused the altitude deviation to be unchanged. Path angle deviation is attributed to pitch-down disturbances and propagation of conditions at third-stage ignition.
4 Boost	530.00 (Stage 4 Burnout)	+38,261	-153	-0.97	-1.50	Motor performance was lower than predicted. Altitude deviation decreased due to a steeper-than-predicted trajectory.
4 Coast	550.50 (Re-entry)	+34,735	-145	-0.97	-1.49	Altitude deviation decreased further due to a steeper-than-predicted trajectory.

TABLE CXC Continued

SCOUT S-144CR
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	75.10 (Stage 2 Ignition)	+5,664	+69	+0.50	+0.97	Motor total impulse was slightly lower than predicted but thrust was higher than predicted. Velocity deviation resulted from an improved drag prediction. Altitude and path angle deviations resulted from the high thrust and the revised drag prediction.
2 Boost	122.00 (After Stage 2 Burnout)	+19,534	+33	+1.17	-0.75	Motor performance was lower than predicted. Altitude and path angle deviations are attributed to pitch-up disturbances and higher-than-predicted thrust. Velocity deviation is attributed to low total impulse; azimuth deviation is attributed to roll and yaw disturbances.
2 Coast	412.13 (Stage 3 Ignition)	+61,245	-165	+0.96	-0.69	Altitude and path angle deviations are attributed to the propagation effects of high altitude, velocity and path angle at second-stage burnout.
3 Boost	488.20 (Stage 4 Ignition)	+59,806	-124	-0.65	-1.00	Motor performance was higher than predicted: offsetting effects caused the altitude deviation to be unchanged. Path angle deviation is attributed to pitch-down disturbances and propagation of conditions at third-stage ignition.
4 Boost	530.00 (Stage 4 Burnout)	+38,261	-153	-0.97	-1.50	Motor performance was lower than predicted. Altitude deviation decreased due to a steeper-than-predicted trajectory.
4 Coast	550.50 (Re-entry)	+34,735	-145	-0.97	-1.49	Altitude deviation decreased further due to a steeper-than-predicted trajectory.

TABLE CXC Continued

SCOUT S-145C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	CONCLUSIONS (Determined during post-flight analysis)
1 Boost	85.42 (Stage 2 Ignition)	+1150	-11	+0.35	-0.32	Tailwinds prevailed to about 37,000 ft altitude where the wind shifted to right quartering, then to right crosswind. The altitude and path angle deviation resulted from the combined effects of winds, higher initial thrust level and pitch-up disturbances after 30 seconds flight time. The azimuth deviation is attributed primarily to winds and the velocity deviation to slightly lower motor performance.
2 Boost	134.40 (Stage 3 Ignition)	+3740	-27	+0.34	-0.25	Because of a pitch-up thrust misalignment, the path angle deviation at second-stage ignition was maintained through boost and the altitude deviation increased. A velocity loss resulted from lower motor performance. The effects of second-stage yaw thrust misalignment were essentially zero and the azimuth error at ignition decreased as it was propagated through second-stage boost.
3 Boost	180.00 (After Stage 3 Burnout)	+1800	-47	-0.39	+0.09	Lower thrust level and a pitch-down thrust misalignment reduced the altitude deviation and shifted the path angle deviation from high to low. A yaw-right thrust misalignment shifted the azimuth deviation from left to right. The increase in velocity deviation resulted from lower motor performance.
3 Coast	482.64 (Stage 4 Ignition)	-4.4 n.mi.	+9	-0.29	+0.08	Third-stage burnout errors were propagated to stage 4 ignition, with an altitude loss resulting from the lower path angle and a corresponding velocity gain resulting from the velocity-altitude trade.
4 Boost	Injection **	-3.9 n.mi.	+11	-0.77	+0.47	The most significant changes from fourth-stage ignition were the increases in path angle and azimuth deviations. These increases are attributed to pitch-down and yaw-right disturbances at ignition and/or during boost.

* Unless otherwise specified.
** Inertial value deviation given.

TABLE CXC Continued

SCOUT S-146C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	78.43 (Stage 2 Ignition)	+1415	-12	+0.55	-0.34	Winds and pitch-up disturbances caused the altitude, path angle and velocity deviations. Only about 15% of the azimuth deviation could be attributed to the winds.
2 Boost	123.23 (Stage 3 Ignition)	+3850	-33	+0.51	-0.54	Because of a pitch-up thrust misalignment, the path angle deviation at second-stage ignition was maintained to burnout and the altitude deviation increased. The velocity deviation increased because of lower motor performance. The increase in azimuth deviation is attributed to the effects of first-stage roll-yaw coupling and a yaw-left thrust misalignment.
3 Boost	160.0 (After Stage 3 Burnout)	+3710	-41	-0.36	-0.98	A pitch-down thrust misalignment shifted the path angle deviation from high at ignition to low at burnout and effected a small decrease in altitude deviation. Lower motor performance caused an increase in the velocity deviation. A yaw-left thrust misalignment and roll-yaw coupling effects propagated from the first-stage increased the azimuth deviation.
3 Coast	683.41 (Stage 4 Ignition)	-4.0 n.mi.	0	-0.24	-0.81	Third-stage burnout errors propagated to fourth-stage ignition with an altitude loss resulting from the lower path angle at burnout and a corresponding velocity gain resulting from the velocity-altitude trade.
4 Boost	Injection **	-4.5 n.mi.	-26	-0.66	0	The increase in altitude and path angle deviation is attributed to a pitch-down disturbance at ignition and/or during boost. A velocity loss resulted from lower motor performance. The azimuth error was reduced to 0; approximately 45% of this decrease resulted when the ignition error was propagated through boost. The elimination of the remaining azimuth deviation is attributed to a yaw-right disturbance at ignition and/or during boost.

* Unless otherwise specified.
** Inertial value deviation given.

TABLE CXC Continued

SCOUT S-147C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	81.44 (Stage 2 Ignition)	+4370	-32	+0.93	+0.18	Altitude and path angle deviations resulted primarily from higher thrust level and pitch-up disturbances. Most of the velocity deviation resulted from wind effects. The deviation in azimuth is attributed to roll and yaw disturbance; winds were in a direction to produce azimuth deviations to the left.
2 Boost	126.06 (Stage 3 Ignition)	+7750	-60	+0.65	-1.16	A pitch-up thrust misalignment contributed about 60% of the total deviation at the end of the boost phase. The deviation decreased from second-stage ignition as the error was propagated through the boost phase. The higher path angle increased the altitude deviation and lower motor performance increased the velocity deviation. The change in azimuth deviation from right to left of predicted is attributed to the combined effects of yaw-left thrust misalignment and roll-yaw coupling effects propagated from the first stage.
3 Boost	163.0 (After Stage 3 Burnout)	+12,000	+12	0	-0.88	A pitch-down thrust misalignment eliminated the path angle deviation but high ignition path angle and higher thrust level caused an increase in the altitude deviation. Higher motor performance produced a velocity gain and a predominately yaw-right thrust misalignment helped to reduce the azimuth deviation.
3 Coast	614.32 (Stage 4 Ignition)	+4.7 n.mi.	-10	+0.19	-0.77	Errors at third-stage burnout were propagated to fourth-stage ignition.
4 Boost	Injection **	+5.6 n.mi.	+4	-0.95	-0.25	A pitch-down disturbance at ignition and/or during boost caused the path angle deviation to shift from higher than predicted at ignition to lower than predicted at burnout. About half of the decrease in azimuth deviation is attributed to a yaw-right disturbance at ignition and/or during boost.

* Unless otherwise specified.
** Inertial value deviation given.

TABLE CXC Continued

SCOUT S-148C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	84.86 (Stage 2 Ignition)	-315	-45	+1.08	-1.06	Tailwinds prevailed to about 20,000 ft altitude when a change to right crosswind occurred. Wind effects contributed 40% of the velocity deviation, 20% of the path angle deviation and 30% of the azimuth deviation. The remaining velocity deviation resulted from lower motor performance, while the remaining deviations in path angle and azimuth are attributed to pitch-up disturbances and roll-right, yaw-left disturbances.
2 Boost	137.08 (Stage 3 Ignition)	+3620	-47	+0.59	-0.77	A pitch-up thrust misalignment caused a higher-than-predicted altitude and contributed about half of the path angle deviation remaining after second-stage boost. The velocity deviation was propagated from the first stage, as was the azimuth deviation which decreased through propagation.
3 Boost	178.0 (After Stage 3 Burnout)	+4730	-40	+0.07	-0.91	The increase in altitude deviation was propagated from the previous stage because of the higher ignition path angle. Higher motor performance resulted in a decrease in velocity deviation and a pitch-down thrust misalignment decreased the path angle deviation. The azimuth deviation increased because of a yaw-left thrust misalignment.
3 Coast	478.71 (Stage 4 Ignition)	+9720	-43	+0.03	-0.82	Errors at third-stage burnout were propagated to fourth-stage ignition without any significant changes.
4 Boost	Injection	+1.9 n.mi.	-39	-0.19	-0.53	Altitude azimuth and velocity durations were propagated from the lower stages. The shift from higher to lower path angle deviation is attributed to pitch-down disturbances at ignition and/or during boost.

* Unless otherwise specified.

TABLE CXCV Continued

SCOUT S-149C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	77.21 (Stage 2 Ignition)	+1950	-37	+0.73	-0.83	The altitude deviation resulted from higher thrust level of the first-stage motor and the velocity deviation from lower motor performance. About half of the path angle deviation is attributed to the effects of higher thrust level and winds; the remainder is attributed to pitch-up disturbances. Roll disturbances, combined with crosswind effects caused the azimuth deviation.
2 Boost	121.23 (Stage 3 Ignition)	+3020	-77	+0.75	-1.31	A pitch-up thrust misalignment maintained the path angle deviation from second-stage ignition through boost and increased the altitude deviation. Lower motor performance increased the velocity deviation. A yaw-left thrust misalignment, combined with roll-yaw coupling effects from the first-stage increased the azimuth deviation.
3 Boost	165.0 (After Stage 3 Burnout)	+3630	-38	+0.06	-1.66	A pitch-down thrust misalignment decreased the path angle deviation and prevented any significant increase in altitude deviation. Higher motor performance decreased the velocity deviation. A yaw-left thrust misalignment, combined with roll-yaw coupling effects from the first stage increased the azimuth deviation.
3 Coast	732.39 (Stage 4 Ignition)	+270	-35	-0.01	-1.43	As third-stage burnout errors were propagated to fourth-stage ignition, lower burnout velocity resulted in a decrease in altitude deviation.
4 Boost	Injection	-5470	-64	+0.16	-1.18	The apparent altitude loss is attributed to uncertainties in radar and Goddard Bulletin data. Lower motor performance caused the increase in velocity deviation. The change from essentially no path angle deviation to higher-than-predicted is attributed to pitch-up disturbances at ignition and/or during boost. As the ignition azimuth error was propagated through boost it decreased, but this reduction was less than would have been achieved if the yaw body-axis orientation had been as predicted. Most of the yaw-left deviation in body attitude at ignition is attributed to the lower stages (roll-yaw coupling effects).

* Unless otherwise specified.

TABLE CXC Continued

SCOUT S-150C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	CONCLUSIONS (Determined during post-flight analysis)
1 Boost	78.80 (Stage 2 Ignition)	+4350	-33	+0.75	+0.04	The higher altitude and about 45% of the path angle deviations were caused by higher thrust level of the first-stage motor. Winds and pitch-up disturbances contributed the remainder of the path angle deviation. Lower motor performance was the primary cause of the velocity deviation. Winds were in a direction to cause a yaw-left azimuth deviation but this effect was compensated by yaw-right disturbances.
2 Boost	120.0 (After Stage 2 Burnout)	+6170	-21	+0.55	+0.33	The altitude deviation increased because of the higher path angle at ignition and a pitch-up thrust misalignment which contributed about 60% of the total path angle deviation at burnout. The velocity deviation decreased as a result of higher motor performance and the azimuth deviation increased because of a yaw-right thrust misalignment.
2 Coast	177.36 (Stage 3 Ignition)	+11,160	-40	+0.59	+0.21	Second-stage burnout errors were propagated to third-stage ignition. Higher burnout path angle caused an increase in the altitude deviation with a corresponding velocity loss.
3 Boost	222.0 (After Stage 3 Burnout)	+12,200	-53	-0.26	-0.21	A pitch-down thrust misalignment changed the path angle deviation from high to low and kept the propagated increase in altitude deviation to a minimum. The velocity loss is attributed to greater-than-predicted value of angle-of-attack that resulted from the thrust misalignment. The changes from right to left of the azimuth deviation was caused by a yaw-left thrust misalignment combined with roll-yaw coupling effects propagated from the lower stages.
3 Coast	421.92 (Stage 4 Ignition)	+5170	-49	-0.16	-0.14	The lower path angle at third-stage burnout caused an altitude loss during coast, with a corresponding decreased velocity and path angle deviation at fourth-stage ignition.
4 Boost	Injection	+4250	-38	-0.64	-0.14	The increase in path angle deviation, decrease in altitude deviation and about half the decrease in velocity deviations are attributed to a pitch-down disturbance at stage 4 ignition and/or during boost. A yaw-left disturbance at ignition and/or during boost maintained the ignition azimuth deviation to injection.

TABLE CXC Continued

SCOUT S-151C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	80.90 (Stage 2 Ignition)	+4010	-40	+1.03	-1.46	About 30% of the path angle deviation and 70% of the altitude deviations were caused by the higher thrust level of the first-stage motor. Winds contributed to the path angle deviation but the primary cause was an unexplained pitch-up moment after 30 seconds flight time. The velocity loss is attributed to the higher path angle and altitude. Approximately 80% of the azimuth deviation is attributed to winds.
2 Boost	125.00 (After Stage 2 Burnout)	+7520	-51	+0.67	-1.04	The increase in altitude was caused by a pitch-up thrust misalignment and the propagation of the pitch-up path angle deviation from the first-stage. The path angle deviation at ignition decreased as it was propagated through boost. About 50% of the total deviation at burnout resulted from a pitch-up thrust misalignment. Roll and yaw disturbances were negligible. The decrease in azimuth deviation was the result of propagation through boost. The increase in velocity deviation is attributed to the higher path angle history.
2 Coast	179.00 (Stage 3 Ignition)	+11,170	-68	+0.67	-1.02	Errors at second-stage burnout were propagated to third-stage ignition with a velocity loss resulting from the increase in altitude deviation.
3 Boost	222.00 (After Stage 3 Burnout)	+11,990	-93	-0.23	-0.63	The velocity loss resulted from greater-than-predicted values of angle-of-attack propagated from the lower stages and increased by a pitch-down thrust misalignment which also caused the change from high to low in path angle deviation. The decrease in azimuth error resulted from propagation of this error from the lower stages.
3 Coast	402.50 (Stage 4 Ignition)	-4,610	-64	-0.40	-0.60	As a result of the altitude loss incurred during coast because of the lower velocity and path angle at third-stage burnout, the velocity deviation decreased and the path angle deviation increased.
4 Boost	N/A	N/A	N/A	N/A	N/A	The fourth-stage failed soon after ignition.

TABLE CXC Continued

SCOUT S-154C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	77.93 (Stage 2 Ignition)	+3590	-10	+0.20	-0.33	Altitude and path angle deviations resulted primarily from the higher thrust level of the first-stage motor. Winds were the primary cause for the heading angle deviation and contributed approximately 50% of the velocity deviation. The remaining velocity loss was attributed to motor burning characteristics.
2 Boost	121.78 (Stage 3 Ignition)	+4370	+5	+0.27	-0.02	A pitch-up thrust misalignment increased the altitude deviation and maintained the path angle deviation. Approximately 80% of the decrease in heading angle deviation can be attributed to the typical decrease in propagated angular errors during a boost phase and 20% to a yaw-right thrust misalignment. The change in velocity deviation is attributed to motor performance.
3 Boost	160.00 (One Second after Stage 3 Burnout)	+3410	+19	-0.21	+0.14	A pitch-down thrust misalignment decreased the altitude deviation and resulted in a negative path angle deviation. The change in heading angle deviation from left to right of predicted was the result of a yaw-right thrust misalignment. The increase in velocity is attributed to higher-than-predicted motor performance for the third-stage motor.
3 Coast	Stage 4 Ignition	-1.4 n.mi.	+58	-0.03	+0.09	Deviations at third-stage burnout were propagated to fourth-stage ignition. The increase in velocity and decrease in path angle deviations resulted from the velocity-altitude trade. The altitude loss resulted from the lower path angle at third-stage burnout.
4 Boost**	Injection	-2.0 n.mi.	-40	+0.10	+0.29	The velocity loss is attributed to lower fourth-stage motor performance. Approximately 60% of the heading angle deviation and the altitude deviation were propagated from the lower stages. The remaining heading angle deviation and the path angle deviation are attributed to the disturbances at fourth-stage ignition and/or boost.

* Unless otherwise specified.

** Values given are relative quantities to permit direct comparison with AN/FPS-16 radar data at fourth-stage ignition.

TABLE CXC Continued

SCOUT S-155C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	81.06 (Stage 2 Ignition)	-4440	-9	-0.34	+0.43	Altitude and path angle deviations resulted primarily from the lower thrust level of the first-stage motor. No large velocity deviation occurred because total impulse was approximately as predicted.
2 Boost	138.63 (Stage 3 Ignition)	-4520	+8	-0.01	+0.35	A pitch-up thrust misalignment compensated for the path angle deviation at ignition and prevented any significant decrease in altitude. A predominately yaw-right thrust misalignment maintained the azimuth deviation at ignition.
3 Boost	180.00 (After Stage 3 Burnout)	-6500	+39	-0.51	-0.06	A pitch-down misalignment resulted in a negative path angle deviation and altitude loss while a yaw left thrust misalignment compensated for the heading angle deviation at ignition. A velocity increase resulted from a higher performing third-stage motor.
3 Coast	549.14 (Stage 4 Ignition)	-6.0 n.mi.	+95	-0.27	-0.03	Deviations at third-stage burnout were propagated to fourth-stage ignition. The increase in velocity and decrease in path angle deviations resulted from the velocity/altitude trade. The altitude loss was the result of the lower path angle at third-stage burnout.
4 Boost**	Injection	-6.3 n.mi.	+96	-0.09	+0.16	Velocity and altitude deviations were propagated from ignition. Altitude decreased because of the lower path angle at ignition. Fourth-stage motor performance appeared to be as predicted. The heading angle deviation is attributed to fourth-stage ignition tip-off and/or fourth-stage disturbances.

* Unless otherwise specified.

** Values shown are relative quantities to permit direct comparison with AN/FPS-16 radar data at fourth-stage ignition.

TABLE CXC Continued

SCOUT S-156C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	76.55 (Stage 2 Ignition)	+5610	-18	+0.71	-0.68	The altitude deviation resulted primarily from the higher thrust level of the first-stage motor, as did approximately 60% of the path angle deviation. Lower motor performance (total impulse) was the cause of the velocity deviation. Winds contributed approximately 30% of the azimuth deviation. Causes for the remaining azimuth and path angle deviations could not be determined from the available flight data.
2 Boost	120.41 (Stage 3 Ignition)	+7810	-26	+0.51	-0.39	A pitch-up thrust misalignment increased the altitude and velocity deviations and maintained a higher-than-predicted path angle. Approximately 50% of the decrease in azimuth deviation is attributed to the typical decrease in propagated angular errors during a boost phase and the remainder to a yaw-right thrust misalignment.
3 Boost	160.00 (After Stage 3 Burnout)	+1.7 n.mi.	+3	-0.12	-0.89	A pitch-down thrust misalignment changed the path angle deviation from above to below predicted. A yaw-left thrust misalignment increased the heading angle deviation. The altitude deviation was propagated from the lower stages and the increase in velocity resulted from higher third-stage motor performance.
3 Coast	Stage 4 Ignition	+1.8 n.mi.	+1	0	-0.75	Deviations at third-stage burnout were propagated to fourth-stage ignition.
4 Boost**	Injection	+1.2 n.mi.	-65	-0.07	-0.43	The velocity loss is attributed to lower fourth-stage motor performance. The deviations in altitude and heading angle were propagated from the lower stages.

* Unless otherwise specified.

** Relative values are given to permit direct comparison with AN/FPS-16 radar data at fourth-stage ignition.

TABLE CXC Continued

SCOUT S- 157C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	78.46 (Stage 2 Ignition)	+2580	-10	+0.17	-0.31	Altitude and path angle deviations resulted primarily from higher thrust level of the first-stage motor. Total impulse for the first-stage motor was approximately as predicted; the lower velocity is attributed to a greater gravity loss caused by the higher path angle. Winds caused the deviation in azimuth.
2 Boost	122.30 (Stage 3 Ignition)	+5200	-43	+0.32	-0.40	A pitch-up thrust misalignment increased the altitude and path angle deviations. Lower second-stage motor performance increased the velocity deviation. The azimuth deviation to the left increased, in spite of a predominately yaw-right thrust misalignment, because of deviations in body-axis orientation propagated from first-stage operation.
3 Boost	163.00 (After Stage 3 Burnout)	+9180	+8	Not available	-0.95	Approximately 35% of the altitude deviation and 55% of the azimuth deviation were propagated from the lower stages. About 45% of the azimuth deviation was caused by a yaw-left thrust misalignment. Higher third-stage motor performance caused the increase in total velocity and 65% of the altitude deviation. A pitch-down thrust misalignment occurred during third-stage operation.
3 Coast	Stage 4 Ignition	+2.1 n.mi**	+9**	+0.10**	-0.84	Radar data for altitude, velocity and path angle were not available.** (The altitude given here was calculated from Goddard Bulletin data; velocity and path angle were propagated from the best post-flight simulation of third-stage radar data.) Heading angle was obtained from radar data propagated from third-stage burnout.
4 Boost	Injection	+2.0 n.m.	-56	-0.18	-0.72	Velocity loss is attributed to low fourth-stage motor performance. The altitude deviation and at least 65% of the azimuth deviation were propagated from the lower stages. The path angle deviation and the remainder of the azimuth deviation are attributed to errors that occurred at separation and/or during fourth-stage boost.

* Unless otherwise specified.

** For the fourth stage, relative values are shown to permit direct comparison with AN/FPS-16 radar data from the lower stages. These values may differ slightly from deviations between inertial values.

TABLE CXC Continued

SCOUT S- 158C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	79.88 (Stage 2 Ignition)	+3936 ft	+8	+0.453	-1.116	The higher altitude and path angle are due to the higher thrust level. The velocity increased because of the higher (0.5%) total impulse. The azimuth deviation is due to winds and a large right roll moment.
2 Boost	177.17 (Stage 3 Ignition)	+10392 ft	0	+0.437	-0.714	The altitude deviation increased due to the pitch up thrust misalignment. The velocity decrease is due to the 0.2% lower total impulse.
3 Boost	220.00 (After Stage 3 Burnout)	+10274 ft	-23	-0.404	-0.459	The altitude deviation remained the same because path angle was above predicted for approximately the same duration as it was below. Path angle decreased because of pitch-down thrust misalignment. Velocity decreased because of the lower (0.15%) total impulse. The lower azimuth deviation is due to continued yaw-right thrust misalignment.
3 Coast	492.89 (Stage 4 Ignition)	-2.37 n.mi**	+21**	-0.357**	-0.347	The altitude deviation is lower than predicted and the velocity is higher due to the low path angle achieved during third-stage operation.
4 Boost	Injection	-2.89 n.mi.	+19.5	-0.203	+0.694	The altitude deviation is less than would be expected with the negative path angle at ignition due to pitch up disturbances at ignition. Velocity decreased because of lower motor performance of 0.11%. The azimuth deviation is due to yaw-right body-axis deviation.

* Unless otherwise specified.

** Deviations are obtained from ignition conditions.

NOTE: 1. For the fourth stage, deviations in relative values are presented since injection conditions shown are compared with FPS-16 radar data of the lower stages. These values may differ from deviations between inertial values.

TABLE CXC Continued

SCOUT S-159C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED **				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	82.40 (Stage 2 Ignition)	-4050	-3	+0.06	-1.25	The altitude deviation resulted from the lower thrust level of the first-stage motor. Approximately 50% of the azimuth deviation was caused by winds.
2 Boost	128.00 (After Stage 2 Burnout)	-2800	-22	+0.72	-1.15	A pitch-up thrust misalignment decreased the altitude deviation and increased the path angle deviation. Lower second-stage motor performance caused a decrease in total velocity. The azimuth deviation did not change significantly because of a yaw-left body-axis deviation propagated from first-stage operation and a predominately yaw-left thrust misalignment.
3 Coast	272.71 (Stage 3 Ignition)	+9770	-76	+0.67	-1.21	Second-stage burnout errors were propagated to third-stage ignition. Altitude increased because of the higher path angle at burnout and the velocity loss resulted from an altitude/velocity trade.
3 Boost	330.66 (Stage 4 Ignition)	+8890	-133	-0.63	-1.41	The decrease in altitude deviation and change from higher to lower path angle is attributed to a pitch-down thrust misalignment. Total velocity decreased during stage operation because of velocity losses resulting from larger values of angle of attack that resulted from the pitch-down thrust misalignment. The deviation in azimuth increased because of a yaw-left thrust misalignment.
4 Boost	362.19 (Predicted Stage 4 Burnout)	+7620	-166	-0.20	-0.66	The decrease in altitude deviation was caused by the lower path angle at ignition. The decrease in flight path and heading angle deviations is attributed to errors that occurred at separation and/or during fourth-stage boost. Lower fourth-stage motor performance caused the increase in velocity deviation.
	375 (After Predicted Stage 4 Burnout)	+7300	-154	-0.22	-0.68	The apparent decrease in velocity deviation is attributed to the effects of "outgassing" or longer burn time for the fourth-stage motor.

* Unless otherwise specified.

** Relative values are given.

TABLE CXC Continued

SCOUT S- 160C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	79.92 (Stage 2 Ignition)	-2.47	-329	-0.18	-1.12	The lower velocity and altitude were caused by the first-stage motor anomaly. The path angle deviation resulted from the lower velocity. Approximately 60% of the heading angle deviation can be attributed to yaw thrust misalignment; the remainder resulted from wind effects and a large right roll moment.
2 Boost	123.79 (Stage 3 Ignition)	-3.81	-310	-0.24	-1.09	Altitude and path angle deviations increased because of the lower velocity at second-stage ignition. The velocity gain resulted from higher motor total impulse. The azimuth deviation at second-stage ignition was sustained through boost by a yaw-left thrust misalignment.
3 Boost	165.00 (After Stage 3 Burnout)	-5.07	-298	-0.62	-1.25	Altitude and path angle deviations increased because of the lower velocity and path angle at third-stage ignition and a pitch-down thrust misalignment. Higher motor total impulse produced a velocity gain. The azimuth deviation increase was caused by a yaw-left thrust misalignment.
3 Coast	661.63	-33.18**	-71**	-1.85**	-1.09**	Deviations at third-stage burnout were propagated to fourth-stage ignition. The decrease in velocity deviation and increase in altitude and path angle deviations resulted from the velocity-altitude trade and the lower path angle at third-stage burnout.
4 Boost	Injection	-36.06	-54	-1.42	-0.82	The altitude deviation increased because of the negative path angle at ignition and a pitch down disturbance during fourth-stage operation. A velocity gain resulted from a combination of higher motor performance, pitch down disturbances, and a heading angle deviation to the left (less yaw-torquing effect). Angular errors at ignition decrease when propagated through a boost phase; this causes the heading and path angle deviations to decrease.

* Unless otherwise specified.

** Deviations were obtained using calculated ignition conditions.

NOTE: 1. Fourth-stage deviations given here in relative values to compare with lower stage AN/FPQ-6 radar data differ from deviations based on inertial values.

TABLE CXC Continued

SCOUT S-161C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1	77.87 (Stage 2 Ignition)	-2720	-9	-0.03	+1.33	The lower altitude, velocity and path angle resulted primarily from the lower thrust level of the first-stage motor. A yaw-right thrust misalignment was responsible for the azimuth deviation.
2 Boost	125 (After Stage 2 Burnout)	-3670	-9	0	+0.23	The altitude deviation increased because of the lower path angle at ignition. A pitch-up thrust misalignment eliminated the path angle error. The decrease in azimuth deviation was due primarily to the decrease in propagated angular error during a boost phase.
2 Coast	176.77 (Stage 3 Ignition)	-2825	-18	+0.04	+0.21	Deviations at second-stage burnout were propagated to third-stage ignition. Velocity-altitude trade caused an increase in velocity deviation and decrease in altitude deviation.
3 Boost	220 (After Stage 3 Burnout)	-6075	-35	-0.65	-0.68	A pitch-down thrust misalignment increased the altitude and path angle deviations and produced larger values of angle-of-attack that resulted in a velocity loss. The azimuth deviation shifted from right to left of predicted because of a yaw-left thrust misalignment and yaw-left deviation in body-axis orientation at ignition.
3 Coast	408.38 (Stage 4 Ignition)	-5.62 n.mi.	+6	-0.58	-0.64	Deviations at third-stage burnout were propagated to fourth-stage ignition. The lower path angle at third-stage burnout caused the decrease in altitude and corresponding velocity gain.
4 Boost	Injection	-6.70** n. mi.	-14.3**	-0.50	-1.10	The altitude deviation increased because of a pitch down disturbance during fourth-stage operation that also maintained the path angle deviation. The velocity loss resulted from lower ideal velocity for the fourth stage. The increase in azimuth deviation is attributed to yaw-left disturbances at ignition and/or during boost.

* Unless otherwise specified.

** Fourth-stage deviations are given here for geodetic altitude and relative velocity to compare with lower stage AN/FPS-16 radar data, and differ from deviations for inertial values.

TABLE CXC Continued

SCOUT S-162C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	77.77 (Stage 2 Ignition)	-410	0	-0.72	-1.85	The lower altitude and 30% of the path angle deviation was due to winds. Azimuth deviation was due to winds, roll moments, and initial yaw thrust misalignment. First-stage motor performed as predicted.
2 Boost	120.74 (Stage 3)	-660	+16	-0.16	-1.05	Altitude and velocity deviations increased due to a negative path angle deviation throughout second-stage operation. A pitch-up thrust misalignment reduced path angle deviation. Azimuth deviation was decreased because the yaw body-axis was to the right of the velocity vector.
3 Boost	160.00 (After Stage 3 Burnout)	-4850	+37	-0.57	-1.20	The shape of the thrust time history, the higher motor total impulse, and a pitch-down thrust misalignment, caused altitude, path angle and velocity deviations to increase. A yaw-left thrust misalignment caused the azimuth deviation to increase.
3 **Coast	734.01 (Stage 4 Ignition)	-18960	+92	+0.05	-1.07	Deviations at third-stage burnout were propagated to fourth-stage ignition. The increase in velocity and altitude deviations resulted from the lower path angle at third-stage burnout and the velocity-altitude trade.
4 Boost	Injection	-20990	-47	-0.49	-0.02	The fourth-stage motor performed much lower than predicted resulting in a low injection velocity. A pitch-down body-axis attitude error at fourth-stage ignition induced a negative path angle deviation at injection. A yaw-right body-axis attitude reduced azimuth deviation to near zero.

* Unless otherwise specified.

** Deviations were obtained using calculated ignition conditions.

NOTE: 1. Fourth-stage deviations are given in relative values to compare with lower stage AN/FPS-16 radar data and differ from deviations between inertial values.

C-6

TABLE CXC - Continued

SCOUT S-163CR
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	80.80 (Stage 2 Ignition)	+750	+4	+0.26	+0.69	First-stage motor performance was slightly higher than predicted. Winds and/or thrust misalignment caused the deviation in path angle, azimuth, and altitude.
2 Boost	161.44 (Stage 3 Ignition)	+4370	-36	+0.38	+0.45	Lower motor performance caused a velocity loss. Pitch-up disturbances increased the path angle and altitude deviation. Yaw disturbances were to the right but were not large enough to increase the azimuth deviation.
Lack of third-stage T/M data and radar data scatter precluded a detailed analysis of the third- and fourth-stages. The following observations were indicated by available radar data, propagated coast trajectories and injection conditions.						
3 Boost	200.00 (After Stage 3 Burnout)	+6310	-107	-0.02	+0.52	All deviations are approximate values. A pitch-down disturbance and lower motor performance are indicated.
3 Coast	436.48 (Stage 4 Ignition)	-5600	-97	-0.43	N/A	These approximate deviations were obtained from propagated coast trajectories. Altitude was derived from injection altitude.
4 Boost	471.54 (Injection)	-3030	-128	+0.51	-0.16	These data were calculated from orbit elements at injection. A pitch-up disturbance at ignition and lower motor performance are indicated.

TABLE CXC Continued

SCOUT S-164C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	85.55 (Stage 2 Ignition)	-1440	-85	+0.23	+1.62	The lower velocity and approximately 50% of the altitude deviation resulted from lower motor performance. Winds caused about 60% of the heading angle deviation.
2 Boost	130.00 (After Stage 2 Burnout)	+310	-79	+0.70	+0.55	A pitch-up thrust misalignment increased the path angle deviation and decreased the altitude deviation. Higher motor performance reduced the velocity deviation. Without a predominately yaw-right thrust misalignment, the deviation in heading angle would have decreased to +0.29 deg.
2 Coast	370.20 (Stage 3 Ignition)	+18,960	-145	+0.13	+0.36	Deviations at second-stage burnout were propagated to third-stage ignition. The higher path angle at second-stage burnout resulted in an altitude gain, velocity loss and a decrease in the path angle deviation.
3 Boost	423.02 (Separation and Re-entry)	+13,990	-178	-0.81	-0.88	A pitch-down thrust misalignment caused a negative path angle deviation that decreased the altitude deviation and larger values of angle-of-attack that resulted in a velocity loss. The azimuth deviation shifted from right to left of predicted because of a yaw-left thrust misalignment.

* Unless otherwise specified.

TABLE CXC Continued

SCOUT S- 165C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	78.65 (Stage 2 Ignition)	-695	-40	-0.15	+0.42	Winds and lower motor performance caused the first-stage velocity loss. The azimuth deviation resulted from yaw-right thrust misalignment and roll-left moment disturbances.
2 Boost	121.29 (Stage 3 Ignition)	-995	-5	+0.20	+0.28	A pitch-up thrust misalignment produced a net change in path angle of +0.35 deg and prevented any significant increase in altitude deviation. The velocity deviation decreased because of higher motor performance. A yaw-right thrust misalignment was cancelled by roll-right moments and the azimuth deviation at second-stage ignition decreased as it was propagated through boost.
3 Boost	163.00 (After Stage 3 Burnout)	+2980	-1	-0.16	-0.31	Pitch-down and yaw-left thrust misalignment resulted in the changes in path angle and heading angle deviations. Altitude became higher because of higher path angle at ignition and higher motor thrust level.
3 Coast	608.99 (Stage 4 Ignition)	-1.62 n. mi.	+20	-0.09	-0.28	Deviations at third-stage burnout were propagated to fourth-stage ignition. The lower path angle at third-stage burnout caused the decrease in altitude and corresponding velocity gain.
4 Boost	Injection	-2.49** n. mi.	+32**	-0.72**	-1.38**	The increase in deviations of all parameters except velocity is attributed to pitch-down and yaw-left disturbances after spinup (separation and fourth-stage ignition). The velocity increase results from higher motor performance.

* Unless otherwise specified.

** Injection deviations are given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. These differ from deviations for inertial values.

TABLE CXC Continued

SCOUT S-166C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	68.49 (Stage 2 Ignition)	+3,176.	+29.	+0.55	+1.83	The ALGOL IIC motor performed very near predicted. Web burn time was shorter than predicted and thrust level higher than predicted until web burn time. The path angle deviation was due to pitch-up disturbances and motor burn characteristics. The integrated jet vane drag was 29% less than predicted. Yaw-right disturbances resulted in an azimuth deviation to the right of predicted.
2 Boost	113.74 (Stage 3 Ignition)	+7,078.	+3.	+0.52	+0.70	The CASTOR IIA motor performed slightly lower than predicted and had a shorter web burn time. The path angle deviation did not decrease due to pitch-up disturbances and the shorter web burn time/higher thrust level. The azimuth deviation decreased due to the yaw body-attitude remaining near its predicted value.
3 Boost	169.85 (Stage 4 Ignition)	+9,762.	-57.	-0.07	+0.71	The ANTARES II motor performed lower than predicted and had a shorter web burn time. Most of the velocity deviation was due to the low performing motor. A pitch-down disturbance caused path angle deviation to switch from positive to negative. The azimuth deviation increased and then decreased, resulting in a zero net change.
4 Boost	205.99 (Stage 4 Burnout)	+24,300.	-114.	+0.07	-0.37	The ALTAIR III motor was ignited 0.67 second early, had a 1.0 second shorter action time, and had a 0.36% lower-than-predicted total impulse. The early ignition and shorter action time/higher thrust level caused altitude deviation to increase significantly. The low performing motor caused velocity deviation to become more negative. The azimuth deviation switched from right to left of predicted due to a yaw-left disturbance.

TABLE CX Continued

SCOUT S- 167C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	79.32 (Stage 2 Ignition)	-1645	-6	-0.17	+0.43	The lower altitude, velocity and flight path angle resulted primarily from the lower thrust level of the first-stage motor. The azimuth deviation is due primarily to a yaw-right thrust misalignment.
2 Boost	121.00 (After Stage 2 Burnout)	-1350	+10	+0.26	+0.15	The higher velocity and altitude was due to higher-than-predicted second-stage motor performance. A pitch-up thrust misalignment and higher-than-predicted motor performance were responsible for the flight path deviation. Due to roll-yaw coupling effects the azimuth moved to the left.
2 Coast	176.84 (Stage 3 Ignition)	+150	-1	+0.13	+0.08	Deviations at second-stage burnout were propagated to third-stage ignition. The increase in altitude is due to the velocity and flight path angle being higher than predicted at second-stage burnout.
3 Boost	221.05 (After Stage 3 Burnout)	+1290	+9	+0.08	-0.52	The higher velocity and altitude was due to a higher-than-predicted flight path angle and higher-than-predicted third-stage motor performance. The azimuth deviation was due to a yaw-left thrust misalignment during third-stage operation.
3 Coast	360.65 (Stage 4 Ignition)	+0.8 n. mi.	+2	+0.1	-0.48	Deviations at third-stage burnout were propagated to fourth-stage ignition. The higher flight path angle and higher velocity caused the increase in altitude.
4 Boost	Injection	+0.2** n. mi.	+23** (+29)	-0.58** (-0.58)	-0.26** (-0.25)	The velocity increase results from higher motor performance. The flight path angle deviation increased due to a pitch-down angle deviation increased due to a pitch-down disturbance and the azimuth deviation decreased because of a yaw-right disturbance.

* Unless otherwise specified.

** Injection deviations are given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. These differ from deviations between inertial values. Inertial values are shown in parentheses below the relative values for reference.

TABLE CXC Continued

SCOUT S- 168c
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	81.47 (Stage 2 Ignition)	-2200	-4	-0.48	-0.38	Altitude and path angle were low due to a downward normal force. Motor performance was near predicted. Half the azimuth deviation was due to roll disturbances.
2 Boost	126.00 (After Stage 2 Burnout)	+250	+10	+0.73	-1.07	Pitch-up thrust misalignment and motor burning characteristics shifted the altitude, velocity and path angle deviations from negative to positive. A yaw-left thrust misalignment and clockwise roll disturbance increased the azimuth deviation.
2 Coast	267.01 (Stage 3 Ignition)	+16260	-53	+0.86	-1.14	Second-stage burnout errors were propagated to third-stage ignition. The altitude increase and velocity decrease were due to a high path angle at second-stage burnout.
3 Boost	326.13 (Stage 4 Ignition)	+26800	-8	+0.78	-0.44	Altitude deviation increased as a result of the high path angle. Motor burning characteristics decreased the velocity deviation. For this stage a pitch-up thrust misalignment prevented path angle deviation from decreasing appreciably. A yaw-right thrust misalignment and roll-left disturbance decreased the azimuth deviation.
4 Boost	359.65 (Predicted Stage 4 Burnout)	+34400	-72	+0.04	-0.09	Altitude deviation increased due to the high path angle. A pitch-down body-attitude error decreased path angle deviation. Azimuth deviation decreased due to a yaw-right body attitude error during fourth-stage operation. The fourth-stage motor action time was 1.4 seconds longer than predicted. Therefore, velocity deviation is compared below, approximately 13 seconds after predicted burnout, to provide for longer-than-predicted burn time and/or outgassing effect.
4 Boost	373.00 (After Predicted Stage 4 Burnout)	+35240	-37	+0.04	-0.07	Velocity deviation from fourth-stage ignition to 373 seconds flight time increased due to the altitude-velocity trade.

* Unless otherwise specified.

TABLE CXC Continued

SCOUT S-169C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	83.64 (Stage 2 Ignition)	-852	-38	+0.21	-0.02	Altitude and velocity deviations were due primarily to low motor performance. The path angle deviation was caused by a pitch-up thrust misalignment during the last portion of first-stage operation, the measured atmosphere and the calculated jet-vane drag.
2 Boost	148.61 (Stage 3 Ignition)	-324	-32	+0.20	+0.05	Altitude and velocity increased due to a combination of a higher performing motor and a pitch-up thrust misalignment. Roll-yaw coupling effects caused the azimuth deviation to increase.
3 Boost	190.00 (After Stage 3 Burnout)	+2402	-21	-0.14	-0.17	The increase in altitude and decrease in velocity was caused by the thrust-time trace of the post-flight motor. Path angle deviation was caused by a pitch-down thrust misalignment. Roll-yaw coupling effects and a yaw-left thrust misalignment caused the increase in the azimuth deviation.
3 Coast	478.96 (Stage 4 Ignition)	-8240	-4	-0.14	-0.18	Deviations at third-stage burnout were propagated to fourth-stage ignition. The lower altitude was caused by the low velocity and path angle at third-stage burnout. The lower velocity deviation was a result of the altitude-velocity trade.
4 Boost	Injection	-8883 -1.46 n.m.	-28 (-36)*	-0.14 (-0.14)*	+0.30 (+0.30)*	The velocity decrease results from a lower motor performance. Azimuth deviation was due to a yaw-right attitude error or disturbance after third-stage separation from fourth stage.

NOTE: Inertial values are shown in parentheses below the relative values for reference.

* Injection deviations are given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. These differ from deviations given for inertial values in section 3.1.1.

TABLE CXC Continued

SCOUT S-170CR
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	83.43 (Stage 2 Ignition)	+3166.	+26.	+0.18	+0.22	The ALGOL III motor performance was higher than predicted and web burn time shorter. Higher motor performance was the primary reason for the positive velocity deviation. Motor burn characteristics and winds caused the higher path angle. The right-of-predicted azimuth deviation was due to a predominate yaw-right disturbance off-set somewhat by the wind effect.
2 Boost	145.69 (Stage 3 Ignition)	+3679.	-7.	+0.02	-0.17	The velocity deviation switched from positive to negative due to low CASTOR IIA motor performance. The pitch attitude was as predicted which reduced the path angle deviation. Predominate yaw-left disturbances caused azimuth deviation to switch from right to left of predicted.
3 Boost	185.00 (After Stage 3 Burnout)	+5866.	-29.	0	-0.76	No telemetry data was available, but radar tracking data indicated the ANTARES II motor performance was lower than predicted. Radar data also indicated the vehicle pitched down as predicted and that there was a yaw-left/roll-clockwise disturbance during third-stage boost.
3 Coast	596.35 (Stage 4 Ignition)	-0.21 n.mi.	-19.	-0.09	-0.72	The negative velocity deviation was the reason the altitude deviation switched from positive to negative.
4 Boost	627.07 (Stage 4 Burnout)	-1.32 n.mi.	-19.	-0.87	-0.65	The ALTAIR III motor performance was very close to predicted. The yaw torquing maneuver was also very close to predicted. There was a rather large pitch plane disturbance causing path angle deviation to become more negative. The yaw plane disturbances were fairly small which reduced the azimuth deviation.

* Unless otherwise specified.

TABLE CXC Continued

SCOUT S-171C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	81.43 (Stage 2 Ignition)	-580	-9	+0.03	+0.65	The velocity deviation was due to low motor performance but was somewhat offset by winds.
2 Boost	125.00 (After Stage 2 Burnout)	-2739	-53	+0.82	-0.64	The velocity and altitude deviations were due to low motor performance. The flight path angle deviation was due to pitch-up thrust misalignment. The azimuth deviation was due to yaw-left thrust misalignment.
2 Coast	263.95 (Stage 3 Ignition)	+15277	-110	+0.77	-0.65	The velocity and altitude deviations were caused by the high path angle at stage 2 burnout.
3 Boost	325.93 (Stage 4 Ignition)	+16058	-192	-0.36	-1.16	The velocity and path angle deviations were caused by reduced ideal velocity of the motor and a larger angle-of-attack during boost due to pitch-down thrust misalignment and high path angle at ignition. The azimuth deviation was caused by yaw-left thrust misalignment.
4 Boost	359.93 (Stage 4 Burnout-Re-Entry)	+14246	-239	-0.41	-0.72	The velocity deviation was caused by low motor performance. The decrease in azimuth deviation during stage 4 boost was due to a yaw-right attitude error near ignition.

TABLE CXC. Continued

SCOUT S-172C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	77.64 (Stage 2 Ignition)	-2175	-11	-0.18	+0.18	Altitude, velocity and path angle deviations were due primarily to low motor performance. Azimuth deviation was due primarily to a yaw-right thrust misalignment.
2 Boost	118.00 (After Stage 2	-1015	+3	+0.20	+0.03	Altitude, path angle, and velocity increased due to a combination of a higher performing second-stage motor and a pitch-up thrust misalignment. Yaw thrust misalignment and some roll-yaw coupling caused the azimuth deviation to decrease.
2 Coast	176.97 (Stage 3 Ignition)	+220	+1	+0.26	+0.04	Deviations at second-stage burnout were propagated to third-stage ignition. The higher altitude results from the high path angle at second-stage burnout.
3 Boost	218.00 (After Stage 3 Burnout)	-1270	-47	-0.39	-0.06	Altitude, path angle, and velocity decreased due to a pitch-down thrust misalignment, lower performing and longer burning third-stage motor. The shaping maneuver during third-stage operation eliminated more "excess velocity" than predicted.
3 Coast	440.27 (Stage 4 Ignition)	-28570 [-4.70 n. mi.]	+12	-0.49	-0.08	Deviations at third-stage burnout were propagated to fourth-stage ignition. The lower altitude was caused by the lower velocity and path angle at stage three burnout. The higher velocity is a result of the altitude-velocity trade.
4 Boost	Injection	-31920 [-5.25 n. mi.]	-121* (-97)	-0.14* (-0.14)	-0.92* (-0.93)	The velocity decrease results from lower motor performance combined with a lower-than-expected velocity at stage-four ignition. Azimuth deviation was due to a yaw-left disturbance during fourth-stage operation.

NOTE: Inertial values are shown in parentheses below the relative values for reference.

* Injection deviations are given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. These differ from deviations given for inertial values.

TABLE CXC' Continued

SCOUT S-173C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis
		ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	83.57 (Stage 2 Ignition)	+3810	+8	+0.48	+0.56	The ALGOL IIB motor performed very near predicted. Web burn time was shorter and the thrust level was higher than predicted until web burn time; this resulted in a positive path angle deviation. Jet vane drag was less than predicted which slightly off-set the lower motor total impulse. Winds were very light and had very little effect.
2 Boost	147.81 (Stage 3 Ignition)	+7860	-17	+0.35	+0.47	A pitch-up disturbance caused path angle deviation to remain positive throughout second-stage boost. The higher path angle profile caused altitude deviation to increase. The CASTOR IIA performed very near predicted. The yaw-right displacement was off-set by an induced yaw-right shift due to roll-yaw coupling; the resulting net change in azimuth was quite small.
3 Boost	190.00 (After Stage 3 Burnout)	---	---	---	---	The vehicle performance after third-stage ignition could not be accurately determined due to the poor quality of radar data and the telemetry drop-out during most of third-stage boost.
3 Coast	386.05 (Stage 4 Ignition)	---	---	---	---	Fourth-stage ignition conditions could not be established due to the poor quality of the radar data.
4 Boost	421.13 (Stage 4 Burnout)	+29300 (+4.8 n.mi)	-83 * (-82)	-0.06 * (-0.06)	-1.10 * (-1.05)	No conclusions were made on fourth-stage performance due to the discontinuity between radar data and computed injection conditions (altitude in particular).

*Note: Injection deviations are given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. These differ from deviations given for inertial values Deviations of inertial values are shown in parentheses below the relative values for reference.

TABLE CXC CONTINUED

SCOUT S-174C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	81.10 (Stage 2 Ignition)	-1036	-14	-0.16	+1.18	Altitude, velocity and path angle deviations were due primarily to low motor performance. Part of the low velocity deviation was offset by winds and thrust misalignment with a net loss in velocity. The azimuth deviation was due to the combined effects of winds and roll and yaw disturbances. Roll disturbances near lift-off contributed a substantial portion of the total azimuth deviation.
2 Boost	139.08 (Stage 3 Ignition)	-285	-36	+0.16	+0.76	The increase in velocity deviation was due primarily to low motor performance. The decrease in altitude deviation and the path angle deviation shift from negative to positive were the result of a pitch-up disturbance and a slightly higher-than-predicted thrust level to web time. The azimuth deviation decrease was the result of slight roll-yaw coupling and the yaw body-attitude staying to the left of the velocity heading during boost.
3 Boost	180.00 (After Stage 3 Burnout)	-184	-32	-0.19	+0.28	The altitude and velocity deviations decreased as a result of a slight over performance by the third-stage motor in terms of the ideal velocity contributed by the stage while the total impulse was slightly lower than predicted. The path angle deviation went from positive to negative due to a pitch-down disturbance. The azimuth deviation decreased as a result of a yaw-left and a roll-right disturbance during third-stage operation.
3 Coast	448.55 (Stage 4 Ignition)	-16823 -2.77 n.mi.	0	-0.21	+0.29	Deviations near third-stage burnout were propagated to fourth-stage ignition. The altitude deviation was caused by the lower velocity and path angle near third-stage burnout. The velocity deviation decreased due to an altitude/velocity trade.
4 Boost	482.27 (Injection)	-17361 -2.85 n.mi.	-38** (-34.3)	+0.16** (-0.15)	-0.72** (-0.69)	The velocity decrease resulted from lower-than-predicted motor performance. The azimuth deviation was due to a yaw-left disturbance during fourth-stage operation.

* Unless otherwise specified.

** Injection deviations are given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. These differ from deviations given for inertial values Deviations of inertial values are shown in parentheses below the relative values for reference.

TABLE CXC Continued

SCOUT S-175C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED ALTITUDE ft	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	CONCLUSIONS (Determined during post-flight analysis
1 Boost	79.09 (Stage 2 Ignition)	+58	+16	-0.37	+0.75	The jet vane drag, based on actual fin deflections, was lower than the predicted jet vane drag resulting in a higher-than-predicted velocity at second-stage ignition.
2 Boost	133.49 (Stage 3 Ignition)	+2611	+9	+0.10	+0.57	Altitude and path angle increased due to a pitch up disturbance. The velocity deviation decreased due to a combination of a higher-than-predicted altitude and a slightly lower-than-predicted second-stage motor performance. The azimuth deviation decreased due to a slight roll-yaw coupling effect and a yaw-left disturbance.
3 Boost	175.00 (After Stage 3 Burnout)	+3483	+4*	-0.06*	+0.68	The altitude deviation increased due to a slightly higher-than-predicted path angle. The path angle deviation decreased due to a pitch-down disturbance. Although the third-stage motor performed slightly higher than predicted the velocity deviation decreased due to a higher-than-predicted angle of attack (alpha). A yaw disturbance increased the azimuth deviation.
3 Coast	552.12 (Stage 4 Ignition)	-1409*	+12*	-0.04*	+0.65*	Deviations at third-stage burnout were propagated to fourth-stage ignition. The lower altitude was a result of the lower path angle. The higher velocity deviation was caused by the altitude-velocity trade.
4 Boost	587.15 (Injection)	-1991	+11** (+10.8)	-0.06** (-0.06)	+0.27** (+0.25)	The fourth-stage motor performed slightly lower than predicted. The path angle deviation increased due to a pitch-down disturbance and the azimuth deviation decreased due to a yaw disturbance.

* Deviations based on estimated radar values

** Injection deviations are given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. These differ from deviations given for inertial values Deviations of inertial values are shown in parentheses below the relative values for reference.

TABLE CXC Continued

SCOUT S-176C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	73.86 (Stage 2 Ignition)	+1080	-11	+0.33	+0.38	A yaw-right thrust misalignment caused the azimuth to deviate to the right. The positive deviation in path angle was caused by a pitch-up thrust misalignment and headwinds. The first-stage motor performed slightly lower than predicted.
2 Boost	118.96 (Stage 3 Ignition)	+2650	-34	+0.43	+0.13	The azimuth deviation decreased even in the presence of some yaw-right thrust misalignment, due to the roll-yaw compensation device maintaining a near-predicted yaw body-attitude reference at the beginning of second-stage boost. The path angle deviation increased due to pitch-up thrust misalignment. The second-stage motor performed slightly lower than predicted.
3 Boost	160.00 (After Stage Burnout)	+2080	-30	-0.15	-0.37	A hard yaw-left thrust misalignment throughout third-stage operation caused azimuth to change from positive to negative. The path angle deviation changed from positive to negative due to a hard pitch-down thrust misalignment. Third-stage motor performance was slightly higher than predicted.
3 Coast	738.16 (Stage 4 Ignition)	-25,370 -4.18 n.mi.	+23	-0.20	-0.33	Deviations at third-stage burnout were propogated to fourth-stage ignition. The lower altitude was caused by the lower velocity and path angle at third-stage burnout. The higher velocity is a result of the altitude-velocity trade.
4 Boost	Injection	-49,740** -8.19 n.mi.	+7** (+6)	-0.95** (-0.95)	+0.02** (+0.02)	A yaw-right, pitch-down disturbance during separation and/or fourth stage operation caused path angle deviation to increase but nearly removed all of the azimuth deviation. The velocity deviation decreased due to lower performing fourth-stage motor. The simulated fourth-stage trajectory indicates a net altitude deviation of 0.8 n. mi. during fourth-stage operation.

NOTE: Inertial values are shown in parenthesis below the relative values for reference.

* Unless otherwise specified.

** Injection deviations are given here for geodetic altitude and Earth relative velocity, path angle and azimuth to compare with lower-stage radar data. These data differ from deviations given for inertial values

TABLE CXC Concluded

SCOUT S-177C
SUMMARY OF BOOST TRAJECTORY PERFORMANCE

STAGE	FLIGHT TIME sec	DEVIATIONS FROM PREDICTED				CONCLUSIONS (Determined during post-flight analysis)
		ALTITUDE ft*	RELATIVE VELOCITY fps	RELATIVE PATH ANGLE deg	RELATIVE AZIMUTH deg	
1 Boost	77.27 (Stage 2 Ignition)	+1440.	+4.	+0.13	+0.16	Higher thrust level of the first-stage motor contributed to the altitude deviation. First-stage motor performance was close to predicted; the higher velocity resulted from lower-than-predicted jet vane drag. Winds caused the azimuth deviation.
2 Boost	122.82 (Stage 3 Ignition)	+4326.	-26.	+0.53	-0.15	The velocity loss resulted from lower motor performance. Pitch-up disturbances increased the path angle and altitude deviations. The azimuth deviation shifted from right to left of predicted because of first-stage roll/yaw coupling effects; thrust misalignment in yaw during stage operation was to the right.
3 Boost	165.00 (After Stage 3 Burnout)	+8029.	-65.	+0.09	-0.59	Pitch-down disturbances reduced the path angle deviation but the path angle remained higher than predicted causing the altitude deviation to increase. Lower motor performance increased the velocity deviation and yaw-left disturbances increased the azimuth deviation.
3 Coast	574.93 (Stage 4 Ignition)	+4141.	-68.	-0.08	-0.48	Lower velocity during coast caused the path angle deviation to shift from slightly above to slightly below predicted, with a decrease in altitude deviation. Velocity losses due to gravity were greater than predicted, increasing the velocity deviation.
4 Boost	609.38 (Injection)	+3342*	-86* (-77.)	-0.67* (-0.64)	-0.55* (-0.54)	A pitch-down disturbance during fourth-stage operation caused an increase in path angle deviation and decrease in altitude deviation while a yaw-left disturbance increased the azimuth deviation. The velocity deviation increased because of lower motor performance.

* Note: Injection deviation given here for geodetic altitude and relative velocity, path angle and azimuth to compare with lower-stage radar data. Deviations of inertial values are shown in parentheses below the relative values for reference.

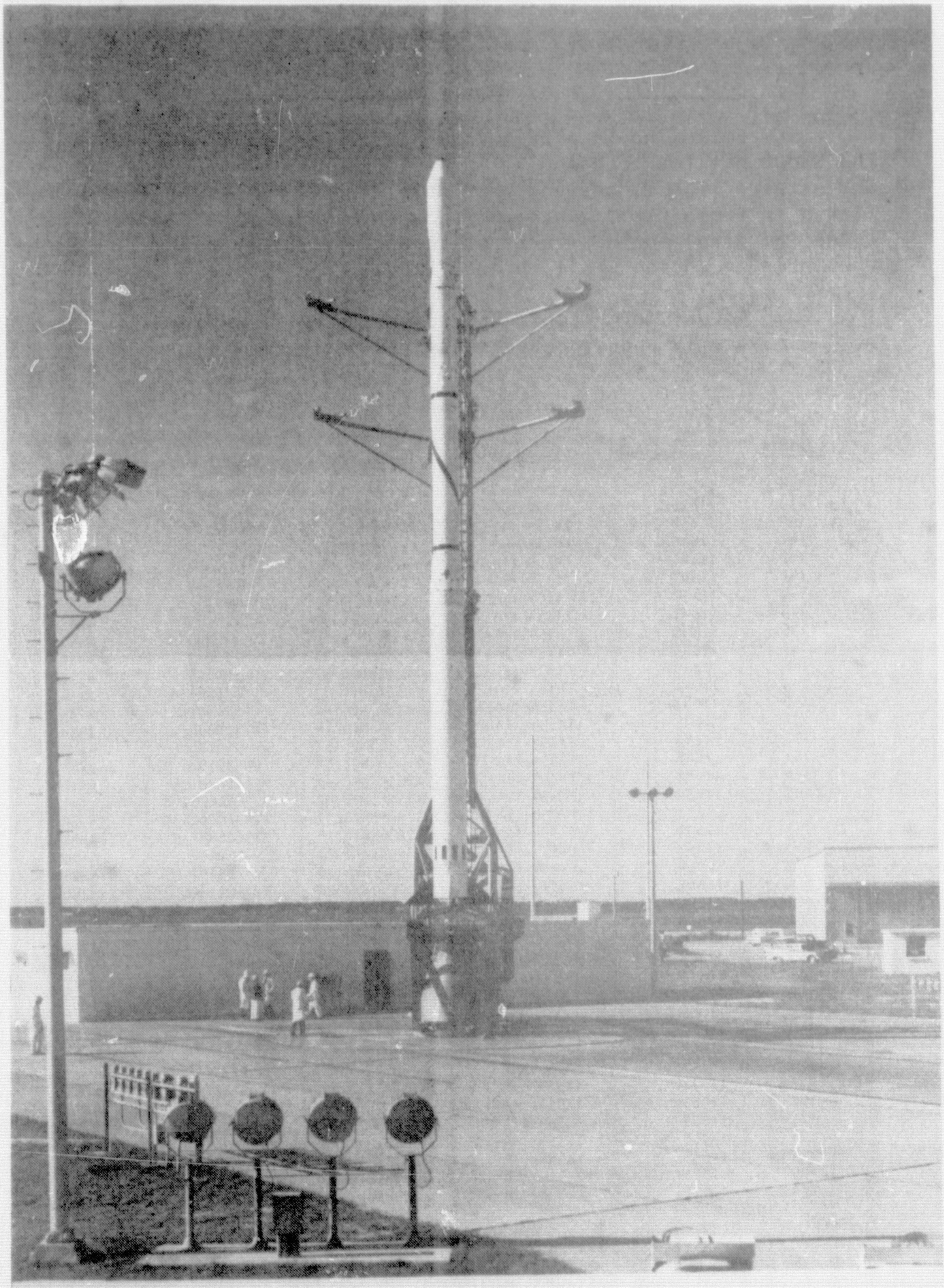


Figure 50.- Scout S-138 being readied for launch.

(e) Motor Data

Following is a brief summary of the motor stages of Scout. The Scout has four stages, all solid propellant; Algol, Castor, Antares, and Altair. The motors and heat shields used in phases IV and V are listed in table CXCI. Physical and performance data for each Scout motor stage are detailed in figures 51 through 58. The status of each motor is presented in tables CXCII through CXCVII.

Actual motor configurations used on the 39 vehicles launched during phases IV and V are presented in table CXCVIII.

TABLE CXCI - HISTORY OF MOTORS AND HEAT SHIELDS USED ON SCOUT PHASES IV AND V#

VEHICLE	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	SHIELD
138	IIB35	XM33E5-178	X249A3HPC154	X258E6RH125	A-26
139	IIB37	XM33E5-189	X259A3HPC165	X258E6RH126	A-28
140	IIB38	TX354-IIA-24	X259A3HPC173	X258E6RH129	A-14
141	IIB40	XM33E5-190	X259A3HPC172	X258E6RH117	A-24
142	IIB44	TX354-IIA-17	X259A3HPC169	X258E6RH116	A-22
143	IIB41	TX354-IIA-16	X259A4HPC170	X258E6RH118	A-31
144	IIB 77	TX354-IIA-185	X259B3HIB225	FW4S2223-8	A-502
145	IIB43	TX354-IIA-20	X259A3HPC174	FW4S20031A	A-29
146	IIB45	TX354-IIA-18	X259A3HPC164	X258E8RH110	A-32
147	IIB50	TX354-IIA-19	X259A3HPC161	FW4S20039	A-30
148	IIB39	TX354-IIA-21	X259A3HPC183	FW4S30105	A-33
149	IIB48	TX354-IIA-25	X259A3HPC177	X258E6RH136	A-34
150	IIB47	TX354-IIA-27	X259A3HPC181	FW4S30201	A-35
151	IIB42	TX354-IIA-29	X259A3HPC184	FW4S30204	A-36
152	IIB49	TX354-IIA-26	X259A3HPC151	FW4S30206	A-40
153	IIB46	TX354-IIA-28	X259A3HPC182	FW4S30202	A-43
154	IIB51	TX354-IIA-98	X259A3HPC163	X258E6RH134	A-37
155	IIB52	TX354-IIA-100	X259A3HIB202	X258E6ABL143	A-41
156	IIB56	TX354-IIA-102	X259A3HIB201	X258E6ABL139	A-39
157	IIB53	TX354-IIA-96	X259A3HIB220	X258E6RH135	A-42R
158	IIB57	TX354-IIA-105	X259A3HPC212	FW4S30210	A-38
159	IIB54	TX354-IIA-101	X259B3HIB205	FW4S30207	A-25
160	IIB62	TX354-IIA-97	X259B3HIB206	FW4S2218-8	A-46
161	IIB59	TX354-IIA-103	X259B3HIB207	FW4S2218-10	A-49
162	IIB58	TX354-IIA-170	X259B3HIB213	X258E5ABL145	A-44
163	IIB69	TX354-IIA-178	X259B3HIB305	FW4S2223-16	A-400
164	IIB65	TX354-IIA-174	X259B3HIB209	NONE	Non-Std.
165	IIB73	TX354-IIA-172	X259B3HIB215	FW4S2223-4	A-47
166	IIC 71	TX354-IIA-183	X259B3HIB301	FW4S2223-11	A-58
167	IIB64	TX354-IIA-173	X259B3HIB216	FW4S2223-1	A-45
168	IIB60	TX354-IIA-104	X259B3HIB210	FW4S2223-2	A-48
169	IIB67	TX354-IIA-171	X259B3HIB217	FW4S2223-5	A-53
170	III-5502-1	TX354-IIA-195	X259B3HIB304	FW4S2376-5	A-401
171	IIB72	TX354-IIA-176	X259B3HIB221	FW4S2223-9	A-62
172	IIB63	TX354-IIA-179	X259B3HIB214	FW4S2223-6	A-56
173	IIB74	TX354-IIA-182	X259B3HIB224	FW4S2223-14	A-54
174	IIB68	TX354-IIA-175	X259B3HIB218	FW4S2223-3	A-57
175	IIB66	TX354-IIA-180	X259B3HIB226	FW4S2223-10	A-61
176	IIB75	TX354-IIA-184	X259B3HIB219	X258E5ABL149	A-55
177	IIB76	TX354-IIA-181	X259B3HIB223	FW4S2223-7	A-59

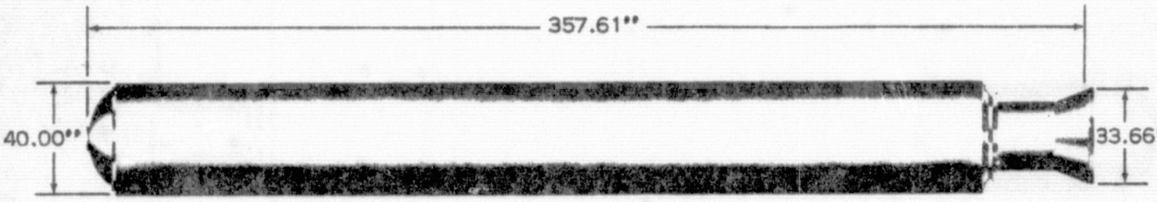
CONTRACTS
First Stage - NAS1-3833, NAS1-5610
Second Stage - NAS1-5034, NAS1-5883, NAS1-5610
Third Stage - NAS1-3493, NAS1-5883, NAS1-5610
Fourth Stage - NAS1-3698, NAS1-5883, NAS1-5610

#Preceding Data in Phases I, II, and III Final Report.

PROPULSION SYSTEM

ALGOL IIC MOTOR DATA

The Algol IIC, Scout first-stage propulsion unit, is being produced by the Aerojet General Corporation, Sacramento, California. The Algol motor incorporates a steel case and a lightweight reinforced plastic nozzle. The propellant grain is a tapered core, four-point star, internal nurning configuration. The grain is a cast-in-case aluminized composite propellant with a polyurethane binder. The igniter is a pelletized flame-producing rocket motor type, with dual squib initiators. This motor is being phased out in favor of Algol IIA.

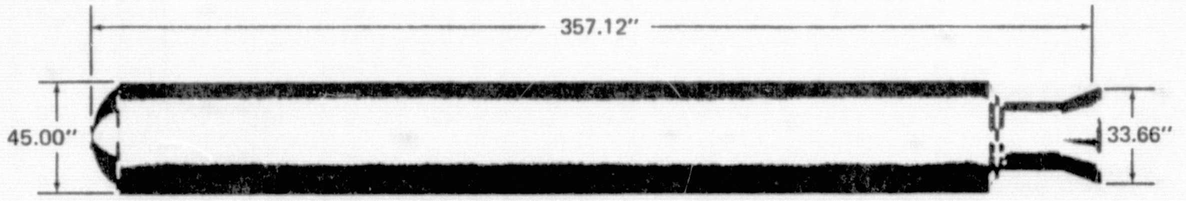


Total Impulse - Lb. - Sec. - Vacuum	5,481,859.
Specific Impulse - Lb. - Sec./lb. - Vacuum	258.88
Burning Time - Total - Sec.	76.08
Thrust - Avg. Web - Lbs. - Vacuum	98,147.
Weight - Total - Lbs. (W_t)	23,799.
Weight - Fuel - Lbs. (W_p)	21,176.
Mass Ratio - W_p/W_t	0.89
Nozzle Expansion Ratio	7.36
Weight Consumed - Lbs.	21,392.
Nozzle Exit Area - Ft.^{2}	5.67

Figure 51.- First-stage propulsion unit used on Scouts A and B.

PROPULSION SYSTEM

The Algol IIIA optional first-stage propulsion unit, is manufactured by United Technology Center (UTC), a division of United Aircraft Corp., Sunnyvale, California. The Algol IIIA combines a steel motor case with a lightweight reinforced plastic nozzle. The propellant grain is a tapered core, four-point star, internal burning configuration. The grain is a cast-in-case aluminized composite propellant with a polybutadiene acrylic nitrile binder. The ignition is a flame producing rocket motor type, with dual squib initiators. This motor has only been launched once in Phase V (S-170).

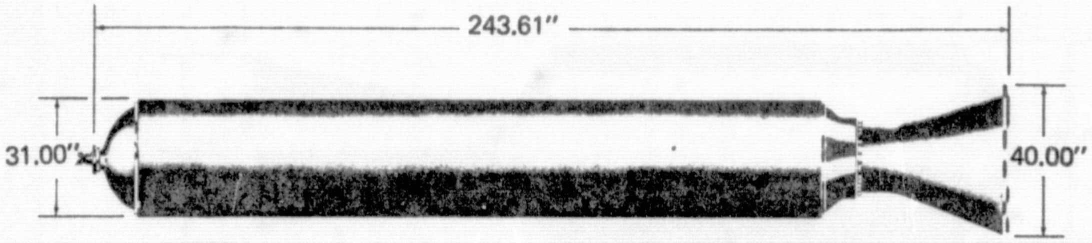


Total Impulse - Lb. - Sec. - Vacuum	7,200,000.
Specific Impulse - Lb. - Sec./lb. - Vacuum	258.2
Burning Time - Total - Sec.	78.0
Thrust - Avg. Web - Lbs. - Vacuum	107,168.
Weight - Total - Lbs. (W_t)	31,165.
Weight - Fuel - Lbs. (W_p)	27,885.
Mass Ratio - W_p/W_t	0.895
Nozzle Expansion Ratio	6.48
Weight Consumed - Lbs.	28,135.
Nozzle Exit Area - Ft.^{2}	5.67

Figure 52.- First-stage propulsion unit used on Scouts D and E.

CASTOR II MOTOR DATA

The Castor IIA rocket motor (TX-543-3) is the Scout second stage propulsion unit and is manufactured by the Thiokol Chemical Corporation, Huntsville Division, Huntsville, Alabama. The motor uses a steel case and an internally insulated steel nozzle. The nozzle and case serve as a structural member on the assembled Scout vehicle. The propellant charge is a polybutadiene acrylic acid (PBAA) binder system. The grain configuration consists of a cylindrical part with two radial slots. The igniter is a rocket motor type (pyrogen) with dual squib initiators. This replaced the Castor I that was used on S-138, 139, and 141.

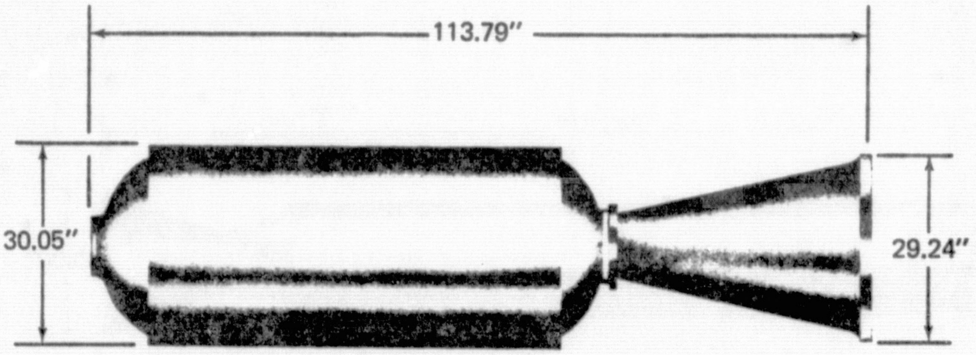


Total Impulse - Lb. - Sec. - Vacuum	2,315,115.
Specific Impulse - Lb. - Sec./Lb. - Vacuum	281.91
Burning Time - Total - Sec.	38.97
Thrust - Avg. Web - Lbs. - Vacuum	61,839.
Weight - Total - Lbs. (W_t)	9,760.
Weight - Fuel - Lbs. (W_p)	8,212.
Mass Ratio - W_p/W_t	0.84
Nozzle Expansion Ratio	20.95
Weight Consumed - Lbs.	8,267.
Nozzle Exit Area - Ft.^{2}	8.11

Figure 53.- Scout second stage propulsion unit.

ANTARES II (X259-B3) MOTOR DATA

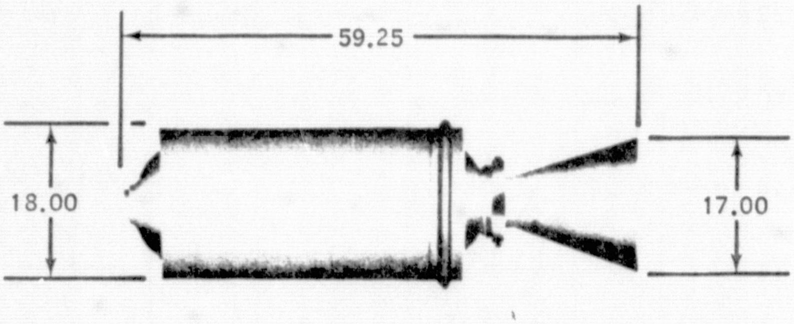
The Antares II rocket motor (X259-B3) was designed specifically as the Scout third stage by Allegany Ballistics Laboratory (ABL), a U. S. Navy BuWeps facility operated by Hercules Powder Company, Cumberland, Maryland. The Antares II (X259) is an improved version of the X254. The motor case and nozzle are fabricated from reinforced plastics. The composite modified double base propellant is a case-bonded slotted-cylinder grain configuration. Ignition is accomplished by a dual squib rocket motor type igniter.



Total Impulse - Lb. - Sec. - Vacuum	724,673.
Specific Impulse - Lb. - Sec./Lb. - Vacuum	281.40
Burning Time - Total - Sec.	35.90
Thrust - Avg. Web - Lbs. - Vacuum	20,931.
Weight - Total - Lbs. (W_t)	2,812.
Weight - Fuel - Lbs. (W_p)	2,575.
Mass Ratio - W_p/W_t	0.91
Nozzle Expansion Ratio	17.50
Weight Consumed - Lbs.	2,600.
Nozzle Exit Area - Ft.^{2}	4.35

Figure 54.- Scout third stage.

The Altair IIA rocket motor (X-258), Scout System upper-stage propulsion unit, is manufactured by Allegany Ballistics Laboratory (ABL), a U.S. Navy BuOrd facility operated by Hercules Powder Company, Cumberland, Maryland. Only three more Altair IIA rocket motors will be used on Scout and then the Altair IIIA will be used permanently.



ALTAIR X258

	Altair X258-B1
Total Impulse - Lb. - Sec. Vacuum	139,294
Specific Impulse - Lb. - Sec. / Lb. Vacuum	278.1
Burning Time - Total - Sec.	24.0
Thrust - Avg.- Web - Lbs. – Vac.	6,176
Weight - Total - Lbs.	573
Weight - Fuel - Lbs.	500.8
Mass Ratio - W_p/W_t	.874
Nozzle Expansion Ratio	25.08
Weight Consumed - Lbs.	507.2

Figure 55.- Scout-A fourth stage.

ALTAIR IIA - PERFORMANCE-VACUUM

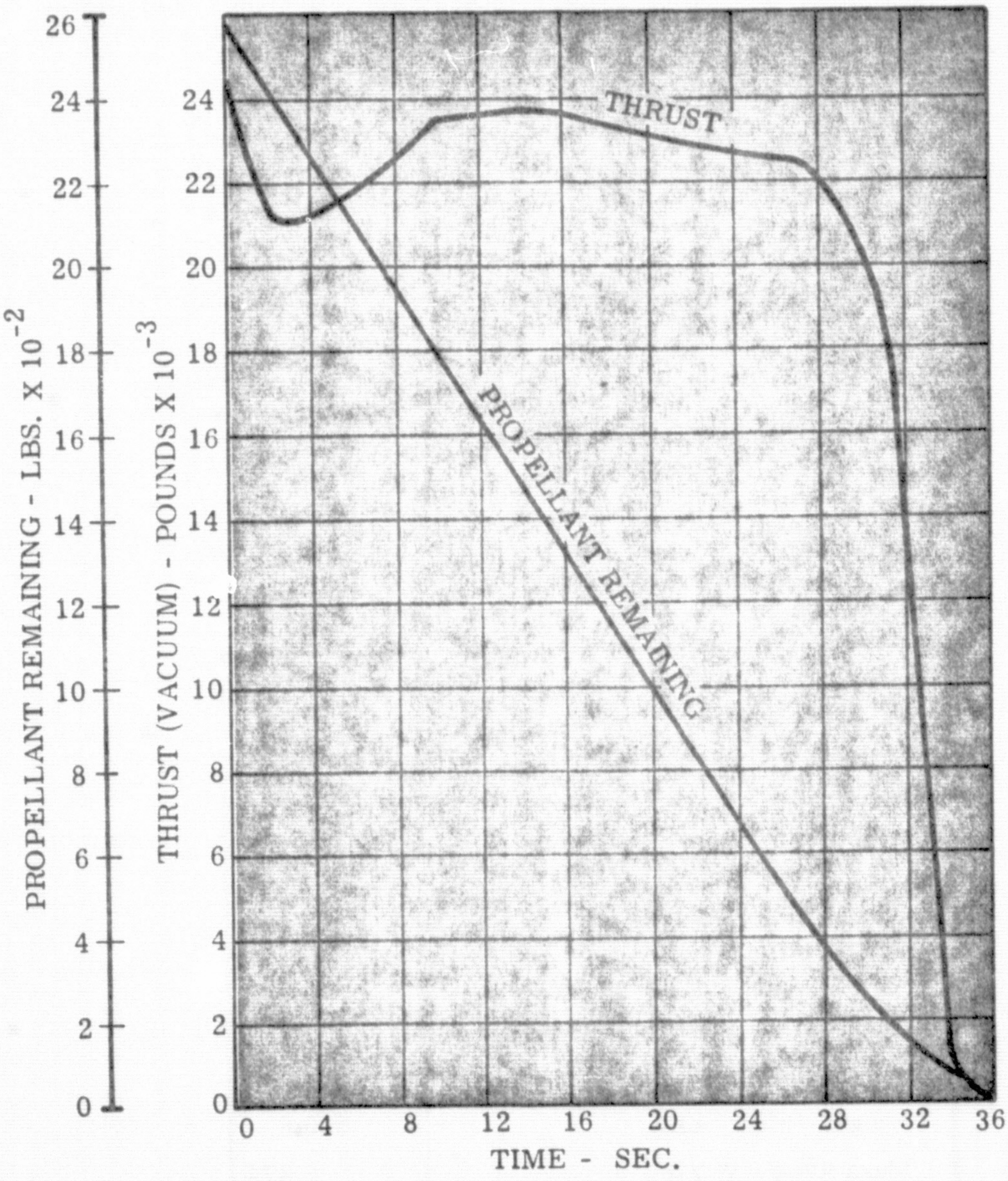
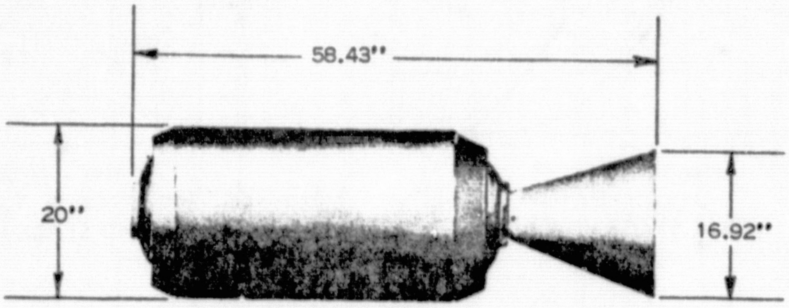


Figure 56.- X-258 rocket motor data.

FW-4S MOTOR DATA

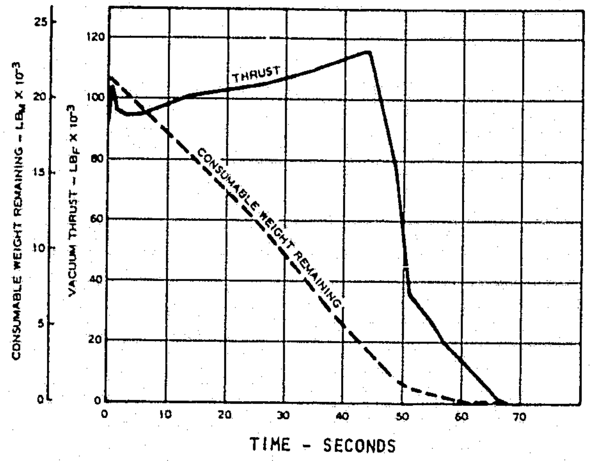
The Altair IIIA rocket motor (FW-4S), Scout fourth-stage propulsion unit, is manufactured by United Technology Center (UTC), Sunnyvale, California, a division of United Aircraft Corp. The motor case is filament wound of fiberglass. The PBAN (polybutadiene acrylic acid - Acrilonitrile) composite propellant grain configuration is a case bonded circular perforation with one transverse slot. Ignition is accomplished by a dual squib rocket motor-type igniter. This motor replaced the Altair IIA.



Total Impulse - Lb. - Sec. - Vacuum	172,243
Specific Impulse - Lb. - Sec./Lbs. - Vacuum	284.07
Burning Time - Total - Sec.	31.47
Thrust - Avg. Web - Lbs. - Vacuum	5,857
Weight - Total - Lbs. (W_t)	664.3
Weight - Fuel - Lbs. (W_p)	606.3
Mass Ratio - W_p/W_t	0.91
Nozzle Expansion Ratio (Initial)	52.8
Weight Consumed - Lbs.	611.3
Nozzle Exit Area - Ft.^{2}	1.5

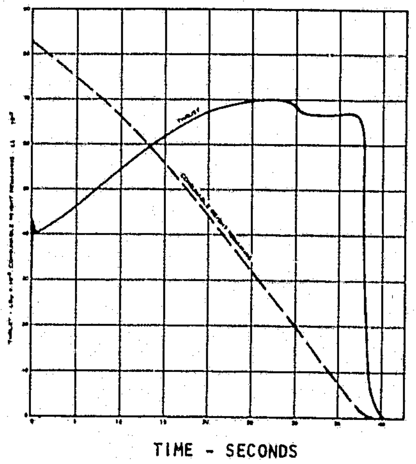
Figure 57.- Scouts B and D fourth-stage propulsion unit.

NOMINAL PERFORMANCE DATA
THRUST VS TIME
FUEL WEIGHT REMAINING VS TIME
(77°F)



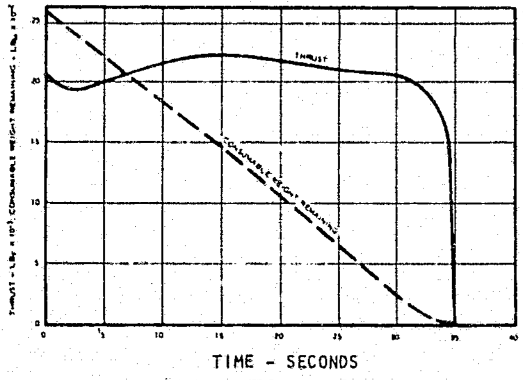
ALGOL IIB

FIRST STAGE MOTOR



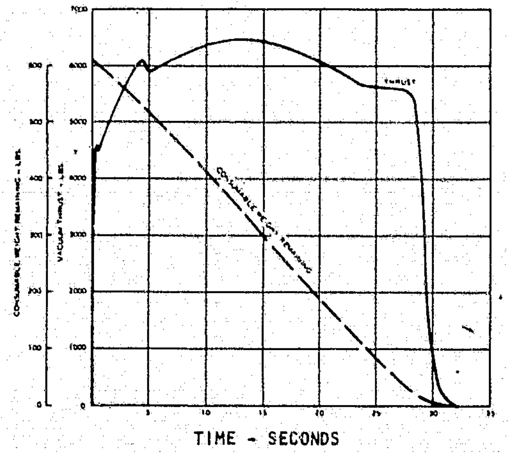
CASTOR II, TX354

SECOND STAGE MOTOR



ANTARES II, X259-A3

THIRD STAGE MOTOR



ALTAIR III, FW-4S

FOURTH STAGE MOTOR

Figure 58.- Scout-B vehicle rocket motor data.

TABLE CXCII - AEROJET MOTOR HISTORY.

ALGOLS I AND II

Number	Contract	Use
IA-1	NAS5-53	Test
IA-2	NAS5-53	Test
IA-3	NAS5-53	STX
*IA-4	NAS5-53	Storage-W
IB-5	NAS5-53	Test
IB-6	NAS5-53	ST-1
IB-7	NAS5-53	ST-3
IB-8	NAS5-53	Reject-Navy (Hydro)
IB-9	NAS5-53	ST-2
IB-10	NAS5-53	ST-5
IC-11	NAS5-53	ST-6
IC-12	NAS5-53	Test (Case S-144)
IC-13	NAS1-585	Test
IC-14	NAS1-585	Air Force D-3
IC-15	NAS1-585	Air Force D-4
IC-16	NAS1-585	Reject
IC-17	NAS1-585	Reject
IC-18	NAS1-585	Air Force D-5
IC-19	NAS1-585	Air Force D-6
IC-20	NAS1-585	Air Force D-8
IC-21	NAS1-585	Reject (Repl/25)
*IC-22	NAS1-585	Storage-W
IC-23	NAS1-585	ST-4
IC-24	NAS1-585	ST-7
IC-25	NAS1-585-3	Air Force D-7
IC-26	NAS1-1330	ST-8
IC-27	NAS1-1330	ST-9
ID-28	NAS1-1330	Test
ID-29	NAS1-1330	S-111
ID-30	NAS1-1330	MSC
ID-31	NAS1-1330	MSC
ID-32	NAS1-1330	MSC
*ID-33	NAS1-1330	S-132
ID-34	NAS1-1330	MSC
ID-AF-1	Air Force	S-112
ID-AF-2	Air Force	S-117
ID-AF-3	Air Force	S-121
*ID-AF-4	Air Force	MSC
IIA-1	NAS1-1330	Test
IIA-2	NAS1-1330	Test
IIA-2R	NAS1-1330	Test
IIA-3	NAS1-1330	Test
IIA-3R	NAS1-1330	Test
IIA-4	NAS1-1330	S-118
IIA-5	NAS1-1330	S-114
IIA-6	NAS1-1330	S-115
IIA-7	NAS1-1330	S-119
IIA-8	NAS1-1330	S-116
**IIA-9	NAS1-1330	S-126
IIA-10	NAS1-1330	Test
IIA-11	NAS1-1330	Test
IIA-12	NAS1-1330	S-120
IIA-13	NAS1-1330	S-113
IIA-14	NAS1-1330-1	S-110
IIB-15	NAS1-1330-1	Test
IIA-16	NAS1-1330-1	S-127
IIA-17	NAS1-1330-1	Test-HC (Case, LRC)
IIA-18	NAS1-1330-1	Test
IIA-19	NAS1-1330-1	Test
IIA-20	NAS1-1330-1	Assgnd. SRT-HC
IIA-21	NAS1-1330-1	S-122
IIA-22	NAS1-1330-1	S-128
IIA-23	NAS1-1330-1	Storage
IIA-24	NAS1-1330-1	S-125
IIB-25	NAS1-1330-1	S-134
IIB-26	NAS1-1330-1	S-124
IIB-27	NAS1-1330-8	S-129
IIB-28	NAS1-1330-8	S-136
IIB-29	NAS1-1330-8	S-123
IIB-30	NAS1-1330-14	S-130
IIB-31	NAS1-3833 (CR-66551)	Test
IIB-32	NAS1-3833	S-133
IIB-33	NAS1-3833	S-135
IIB-34	NAS1-3833	S-137
IIB-35	NAS1-3833	S-138
IIB-36	NAS1-3833	S-131
IIB-37	NAS1-3833	S-139
IIB-38	NAS1-3833	S-140
IIB-39	NAS1-3833	S-148
IIB-40	NAS1-3833	S-141
IIB-41	NAS1-3833	S-143
IIB-42	NAS1-3833	S-151
IIB-43	NAS1-3833	S-145
IIB-44	NAS1-3833	S-142
IIB-45	NAS1-3833	S-146
IIB-46	NAS1-3833	S-153
IIB-47	NAS1-3833	S-150
IIB-48	NAS1-3833	S-149
IIB-49	NAS1-3833	S-152
IIB-50	NAS1-3833	S-147
IIB-51	NAS1-3833	S-154
IIB-52	NAS1-3833	S-155
IIB-53	NAS1-3833	S-157
IIB-54	NAS1-3833	S-159
IIB-55	NAS1-3833	Static Tests
IIB-56	NAS1-3833	S-156
IIB-57	NAS1-3833	S-158
IIB-58	NAS1-3833	S-162

*Traded with Air Force (IA-4 AF property).
**Sold to Air Force (63-27).
MSC-transferred to MSC.

TABLE CXCII Concluded - AEROJET MOTOR HISTORY.

ALGOLS I AND II

Number	Contract	Use
IIB-59	NAS1-5610	S-161
IIB-60	NAS1-5610	S-168
IIB-61	NAS1-5610	Test
IIB-62	NAS1-5610	S-160
IIB-63	NAS1-5610	S-172
IIB-64	NAS1-5610	S-167
IIB-65	NAS1-5610	S-164
IIB-66	NAS1-5610	S-175
IIB-67	NAS1-5610	S-169
IIB-68	NAS1-5610	S-174
IIB-69	NAS1-5610	S-163
IIB-70	NAS1-5610	Storage-Shelf Life Study
IIB-71	NAS1-5610	S-166
IIB-72	NAS1-5610	S-171
IIB-73	NAS1-5610	S-165
IIB-74	NAS1-5610	S-173
IIB-75	NAS1-5610	S-176
IIB-76	NAS1-7199	S-177
IIC-77	NAS1-7199	S-144

UNITED TECHNOLOGY CORPORATION

ALGOL III

NUMBER	CONTRACT	USE
III-1	NAS1-9258	Assigned S-170

TABLE CXCIII - THIOKOL MOTOR HISTORY (Huntsville).

Castor I (XM-33)

Number	Contract	Use
1E5-62	L-55931-3	Test
1E5-77	L-55931-3	ST-1
1E5-82	L-55931-3	ST-2
1E5-83	L-55931-3	ST-3
1E5-92	L-55931-3	ST-4
1E5-93	L-55931-3	Test
1E5-94	L-55931-3	Air Force
1E5-95	L-55931-3	Air Force
1E5-102	L-77203-5	Air Force
1E5-103	L-77203-5	Air Force
1E5-104	L-77203-5	Air Force
1E5-107	L-77203	Air Force
***1E5-108	L-77203	ST-6
1E5-109	L-77203	Air Force
1E5-110	L-77203	Test
1E5-111	L-77203	Air Force
1E5-112	L-77203	Air Force
1E5-113	L-77203	Air Force
1E5-114	L-77203-5	Reject
1E5-124	L-89845	ST-7
1E5-125	L-89845	ST-8
1E5-126	L-89845	Reject
*1E5-128	L-67666	ST-9
1E5-143	L-77203-6	S-113
1E5-147	L-93419	S-111
1E5-148	L-93419	S-120
1E5-149	L-93419	S-114
1E5-150	L-93419	S-118
***1E5-151	L-93419	Air Force
1E5-152	L-93419	S-122
1E5-153	L-93419	S-115
1E5-154	L-93419	S-119
1E5-155	L-93419	S-110
1E5-156	L-93419	Test
*1E5-157	L-93419	Exch. for 1E5-128
**1E5-158	L-93419	S-126
1E5-159	L-93419	S-129
1E5-160	L-93419	S-132
1E5-161	L-93419	S-137
1E5-175	AF Contract	S-112
1E5-176	AF Contract	S-117
1E5-177	AF Contract	S-121
**1E5-178	AF Contract	S-138
1E5-179	L-2061	S-133
1E5-180	L-2061	S-128
1E5-181	L-2061	S-116
1E5-182	L-2061	S-125
1E5-183	L-2061	S-127
1E5-184A	L-2061	S-123
1E5-185A	L-2061	S-136
1E5-186	L-2061	Reject
1E5-187	L-2061	Reject
1E5-188	L-2061	S-134
1E5-189	L-2061	S-139
1E5-190	L-2061	S-141
1E7-191	L-2061	AF B.S.J.
1E7-192	L-2061	AF B.S.J.
1E7-193	L-2061	AF B.S.J.
1E7-194	L-2061	Reject
1E7-195	L-2061	AF Beanstalk
1E7-196	L-2061	AF Beanstalk
1E7-197	L-2061	AF Beanstalk
1E7-198	L-2061	AF Beanstalk
1E7-199	L-2061	AF Beanstalk
1E5-252	L-93419-8	S-124
1E7-253	L-6992	AF B.S.J.
1E7-254	L-6992	AF B.S.J.
1E7-255	L-6992	AF B.S.J.
1E7-257	L-6992-2	AF B.S.J.
1E7-258	L-6992-2	AF B.S.J.
1E7-259	L-6992-2	AF B.S.J.
1E7-260	L-6992-2	AF B.S.J.
1E7-261	L-6992-2	AF B.S.J.
1E7-262	L-6992-2	AF B.S.J.
1E7-303	L-2061-8	AF B.S.J.
1E5-326	L-77203	ST-5
1E5-371	Unknown	(Case S-144)
1E5-422	L-2061-9	S-130
1E5-423	L-2061-9	S-135
1E5-534	NAS1-5034	Storage
1E5-535	NAS1-5034	Storage

---

*128 borrowed from LRC, returned #157.

**Lent AF, recd. #178 in return.

***Borrowed 108 from 609A Program, replaced by 151.

TABLE CXCIII Concluded - THIOKOL MOTOR HISTORY.
Castor II (TX354-3)

NUMBER	CONTRACT	USE	NUMBER	CONTRACT	USE
IIA-1	L15993	Test	IIA-99	NAS1-5883	Test (Case to LRC Show)
IIA-2	L15993	Reject	IIA-100	NAS1-5883	S-155
IIA-3	L15993	Test	IIA-101	NAS1-5883	S-159
IIA-4	L15993	Test	IIA-102	NAS1-5883	S-156
IIA-5	L15993	Test	IIA-103	NAS1-5883	S-161
IIA-6	L15993	Test	IIA-104	NAS1-5883	S-168
IIA-7	L15993	Test	IIA-105	NAS1-5883	S-158
IIA-16	NAS1-5034	S-143	IIA-170	NAS1-5610	S-162
IIA-17	NAS1-5034	S-142	IIA-171	NAS1-5610	S-169
IIA-18	NAS1-5034	S-143	IIA-172	NAS1-5610	S-165
IIA-19	NAS1-5034	S-147	IIA-173	NAS1-5610	S-167
IIA-20	NAS1-5034	S-145	IIA-174	NAS1-5610	S-164
IIA-21	NAS1-5034	S-148	IIA-175	NAS1-5610	S-174
IIA-22	L15993	Test	IIA-176	NAS1-5610	S-171
IIA-23	NAS1-5034	S-131	IIA-177	NAS1-5610	Test
IIA-24	NAS1-5034	S-140	IIA-178	NAS1-5610	S-163
IIA-25	NAS1-5034	S-149	IIA-179	NAS1-5610	S-172
IIA-26	NAS1-5034	S-152	IIA-180	NAS1-5610	S-175
IIA-27	NAS1-5034	S-150	IIA-181	NAS1-5610	S-177
IIA-28	NAS1-5034	S-153	IIA-182	NAS1-5610	S-173
IIA-29	NAS1-5034	S-151	IIA-183	NAS1-5610	S-166
IIA-96	NAS1-5883	S-157	IIA-184	NAS1-5610	S-176
IIA-97	NAS1-5883	S-160	IIA-185	NAS1-7199	S-144
IIA-98	NAS1-5883	S-154	IIA-195	NAS1-7199	S-170

TABLE CXCIV - ANTARES HIB-X259 HISTORY

Number	Contract	Use
A1-1	NOrd 16640(3-138)**	Test
A1-2	NOrd 16640(3-138)**	Test
A1-3	NOrd 16640(3-138)**	Test
A1-4	NOrd 16640(3-138)**	Test
A1-5	NOrd 16640(3-138)**	Test
A1-6	NOrd 16640(3-138)**	Test
A1-7	NOrd 16640(3-138)**	Test
A1-9	NOrd 16640(3-138)**	Test
A1-11	NOrd 16640(3-138)**	Test
A3-16	L-93985	S-111
A3-17	L-93985	ST-9
A2-18	NOrd 16640(3-138)**	Test
A2-19	NOrd 16640(3-138)**	Test
A2-20	NOrd 16640(3-138)**	Test
A2-21	NOrd 16640(3-138)**	Test
A2-22	NOrd 16640(3-138)**	Test
A2-23	NOrd 16640(3-138)**	Test
A3-24	L-93985	S-117
A3-25	L-93985	S-112
A3-26A	L-93985	S-121
A2-100	L-93985	USNAP-Crane Test
A2-101	L-93985	Test
A2-102	L-3920	Test
A2-103A	L-93985	Test
A3-104	L-3920	Reject
A3-105	L-93985	S-114
A3-106	L-3920	S-116
A2-107A	L-93985	Test-fire
A3-108	L-93985	S-118
A3-109C	L-3920	S-127
A3-110A	L-93985-3	S-110
A2-111	L-93985	Test
A3-112	L-93985-3	S-126
A2-113	L-3920	Test
A2-114	L-3920	Test
A2-115	L-3920	Test
A2-116	L-3920	Burst Test
A3-117	L-3920	S-119
A4-118	L-3920	S-132
A4-119	L-3920	S-115
A3-120	L-3920	Reject-Test
A3-122	L-3920	S-120
A4-123	L-3920	Air Force
A3-124	L-3920	Air Force(ETR)
A2-126A	L-3920	Test - SRT
A2-127	L-3920-9	Test
A2-128	L-3920	S-113
A3-129	L-3920	Reject-AMPD
A3-130	L-3920	S-124
A3-132	L-3920-2	S-128
A4-133	L-3920	Air Force
A3-134	L-3920	S-122
A3-135	L-3920	Air Force (ETR)
A3-136A	L-3920	S-129
A2-137	NAS1-3493	Q.A. Test
A3-139	L-3920	S-133
A3-140	L-3920	Air Force
A3-141	L-3920	Air Force
A2-142	L-3920	H-Assigned Test
A3-143	L-3920	S-123
A5-144	L-3920	Fire
A3-145	L-3920-4	S-134
A3-146	L-3920-4	S-125
A3-148	L-3920	Reject-Navy
A2-150	L-3920-4	ABL-Nozzle Test
A3-151	L-93985-12	S-152
A3-152	L-3920	Air Force
A3-153	L-3920	Air Force
A3-154	L-3920	S-138
A3-155	L-3920	Air Force
A3-156	L-3920	Air Force
A3-157	L-3920	S-130
A5-158	L-93985-12	Fire
A3-159	NAS1-3493	S-135
A3-160	NAS1-3493	S-131
A3-161	NAS1-3493	S-147
A3-162	NAS1-3493	Reject-case
A3-163	NAS1-3493	S-154
A3-164	NAS1-3493	S-146
A3-165	NAS1-3493	S-139
A3-166	NAS1-3493	S-136
A3-167	NAS1-3493	S-137
A3-168	NAS1-3493	Demolished
A3-169	NAS1-3493	S-142
A3-170	NAS1-3493	S-143
A3-171	NAS1-3493	Q.A. Test(S-144 case)
A3-172	NAS1-3493	S-141
A3-173	NAS1-3493	S-140
A3-174	NAS1-3493	S-145
A6-175	NAS1-3493	Air Force (WS)
A6-176	NAS1-3493	Air Force (WS)
*A3-177	NAS1-3493	S-149
A3-178	NAS1-3493	QA5883
A2-179	NAS1-3493	Wasp (SPARTA)
A3-180	NAS1-3493	Air Force
A3-181	NAS1-3493	S-150
A3-182	NAS1-3493	S-153
A3-183	NAS1-3493	S-148
A3-184	NAS1-3493	S-151
A2-185	NAS1-3493	Wasp
*A3-186A	NAS1-3493	Reject-Storage

---

*Wasp motor transferred to Scout.

**Direct by OSSA-Hqs.

TABLE CXCIV Concluded - ANTARES HIB-X259 HISTORY

NUMBER	CONTRACT	USE
*A3-187	NAS 1-3493	Case Test-SRT
*A3-201	NAS 1-3493/5883	S-156
*A3-202	NAS 1-3493/5883	S-155
*A3-203	NAS 1-3493/5883	Test-AEDC#
A3-204	NAS 1-5883	Reject** (W.I.)
B3-205	NAS 1-5883	S-159
B3-206	NAS 1-5883	S-160
B3-207	NAS 1-5883	S-161
B3-208	NAS 1-5883	(Test) Grain Mis-oriented
B3-209	NAS 1-5883	S-164
B3-210	NAS 1-5883	S-168
B3-211	NAS 1-5883/5610	Dropped - Reject
B3-212	NAS 1-5883/5610	S-158
B3-213	NAS 1-5610	S-162
B3-214	NAS 1-5610	S-172
B3-215	NAS 1-5610	S-165
B3-216	NAS 1-5610	S-167
B3-217	NAS 1-5610	S-169
B3-218	NAS 1-5610	S-174
B3-219	NAS 1-5610	S-176
B3-220	NAS 1-5610	S-157
B3-221	NAS 1-5610	S-171
B3-222	NAS 1-5610	Assigned Test-S.L.
B3-223	NAS 1-5610	Assigned S-177
B3-224	NAS 1-5610	S-173
B3-225	NAS 1-5610	S-144
B3-226	NAS 1-5610	S-175
B3-301	NAS 1-7199	S-166
B3-302	NAS 1-7199	S-183
B3-303	NAS 1-7199	S-184
B3-304	NAS 1-7199	Assigned S-170
B3-305	NAS 1-7199	S-163

---

*HPC.

**Replacement due.

#Case to LRC Show.

TABLE CXCV - HERCULES INCORPORATED.

Altair II (RH-X-258) History

Number	Contract	Use	Number	Contract	Use
A1-1	NASA Hq.	Test	**C2-73-D	NAS1-3698	S-133
A1-2	NASA Hq.	Test	C2-74	NAS1-3698	S-135
A1-3	NASA Hq.	Test	C1-75	NAS1-3698	S-137
A1-4	NASA Hq.	Test	C2-76	NAS1-3698	Air Force
A1-5	NASA Hq.	Test	C2-77	NAS1-3698	Delta
A1-6	NASA Hq.	Test	C4-78	NAS1-3698-3	Delta
A1-7	NASA Hq.	Test	C4-79	NAS1-3698-3	Delta
A1-9	NASA Hq.	Test	C4-80	NAS1-3698-3	Delta
A1-10	NASA Hq.	Test	*C3-81-D	NAS1-3698-3	S-136
A1-13	NASA Hq.	Test	C4-82	NAS1-3698-6	Aging test-1968
A1-15	NASA Hq.	Test	C4-83	NAS1-3698-6	Delta
A2-18	NASA Hq.	Test	C4-84	NAS1-3698-6	Delta
A1-19	NASA Hq.	Test	C4-85	NAS1-3698-6	Air Force
A2-20	NASA Hq.	Test	C2-86	NAS1-3698-3	Delta
A2-21	NASA Hq.	Test	C4-87	NAS1-3698-6	Delta
A2-22	NASA Hq.	Test	C4-88	NAS1-3698-9	Delta
B1-23	NASA Hq.	Test	C4-89	NAS1-3698-9	Delta
B1-24	NASA Hq.	Test	C4-90	NAS1-3698-9	Delta
B1-25	NASA Hq.	Test	C4-91	NAS1-3698-9	Delta
B1-28	NASA Hq.	Test	C4-92	NAS1-3698-9	Delta
B1-30	NASA Hq.	Test	E2-100	NAS1-3698	Test
B1-32	L-8735	Test	E4-101	NAS1-3698	Reject-case
B1-34	L-8735	Test	E4-102	NAS1-3698	Reject-case
B1-35	L-6990	Test	E4-103	NAS1-3698	Reject-case
B1-36	L-6990	Test	E4-104	NAS1-3698	Empty case
B1-37	L-6990	Test	E4-105	NAS1-3698	Test
B1-39	L-8735	Test	E4-106	NAS1-3698	Test
B1-40	L-8735	Test	E4-107	NAS1-3698	Reject-ins.
B1-41	L-8735	Test	E10-108	NAS1-3698	Test
B1-42	L-8735	Test	E4-109	NAS1-3698	Air Force
B1-45	L-6990	Test	E8-110	NAS1-3698	S-146
B1-46	L-6990-2	Test	E4-111	NAS1-3698	Reject-test
B1-47	L-6990-4	Test	E4-112	NAS1-3698	Reject-case
B1-48	L-6990-3	S-113	E10-113	NAS1-3698	Air Force
B1-49	L-6990-3	Test	E4-114	NAS1-3698	Reject-Ins.
B1-50	L-6990	Test	E4-115	NAS1-3698	Mock-up
B1-53	L-6990-4	S-132	E6-116	NAS1-3698	S-142
B1-54	L-6990-3	Reject	E6-117	NAS1-3698	S-141
C1-55-L	NAS1-3664	S-125	E6-118	NAS1-3698	S-143
C1-56-D	NAS1-3664	Test	E6-119	NAS1-3698	Air Force-Satar
C2-58-L	NAS1-3664	Delta-test	E6-120	NAS1-3698	Reject-case
*B2-60	L-6990-5	Delta-IMP	E4-121	NAS1-3698	Delta
B1-61	L-6990-5	S-122	E6-122	NAS1-3698	Test-case
**X2-63-J	NAS1-3664	Delta-test	E6-123	NAS1-3698	Test
C1-64-N	NAS1-3664	S-124	E6-124	NAS1-3698	Test
C1-65-N	NAS1-3664	Javelin	E6-125	NAS1-3698	S-138
C1-66-N	NAS1-3664	S-128	E6-126	NAS1-3698	S-139
B2-67-D	NAS1-3664	Delta	E6-127	NAS1-3698	Test
C1-68	NAS1-3698	S-134	E6-128	NAS1-3698	Test
C2-69	NAS1-3698	Delta	E6-129	NAS1-3698	S-140
C1-70	NAS1-3698	S-129	E6-130	NAS1-3698	Test-Shelf Life
C2-71	NAS1-3698	Delta-test	E6-131	NAS1-3698	Air Force-Satar
C1-72	NAS1-3698	S-123	***E6-132	NAS1-3698	Air Force-Satar
			****E6-133	NAS1-3698	Delta-Air Force

---

*On loan to Delta, recd. 81 in return.

**On loan to Delta, recd. 73 in return.

***Delta on loan to Air Force.

****Traded Air Force for FW-4S 20033.

TABLE CXCV Concluded - HERCULES INCORPORATED.
Altair II (X-258) History

NUMBER	CONTRACT	USE
RHE6-134	NAS 1-3698	S-154
RHE6-135	NAS 1-3698	S-157
RHE6-136	NAS 1-3698	S-149
RHE6-137	NAS 1-3698	Air Force-Satar
E6-138	NAS 1-5883	Air Force-Satar
E6-139	NAS 1-5883	S-156
E6-140	NAS 1-5883	Delta-18
E6-141	NAS 1-5883	Delta-19
E6-142	NAS 1-5883	Reject (Repl. w/161) Igniter Test
E6-143	NAS 1-5883	S-155
E5-144	NAS 1-5883-3	Reject
E5-145	NAS 1-5883-3	S-162
E5-146	NAS 1-5883-3	Rejected

TABLE CXCVI - UNITED TECHNOLOGY CORPORATION
Altair III (FW4S) History

NUMBER	CONTRACT	USE
20002	AF04(695)-588	Test-AEDC
20003	AF04(695)-588	Test-AEDC
20004	AF04(595)-588	Test-AEDC
20005	AF04(695)-588	Test
20006	AF04(695)-588	Reject
20007	AF04(695)-588	Test
20008	AF04(695)-588	Test
20009	AF04(695)-588	Reject
20010	AF04(695)-588	Reject
20011	AF04(695)-588	Reject
20012	AF04(695)-588	Reject
20013	AF04(695)-588	Reject
20014	AF04(695)-588	Case-Test
20015	AF04(695)-588	Test-Loads
20016	AF04(695)-588	Test
20017	AF04(695)-588	Test
20018	AF04(695)-588	Test
20019	AF04(695)-588	Test
20020	AF04(695)-588	Test
20021	AF04(695)-588	Air Force
20022	AF04(695)-588	Reject
20023	AF04(695)-588	Reject
20024	AF04(695)-588	Test-AEDC
20030	AF04(695)-588	Test-AEDC
20031A	AF04(695)-488	S-145
20032	AF04(695)-588	Air Force
**20033	AF04(695)-588	Delta
20034	AF04(695)-588	Air Force
20035	AF04(695)-588	Test-AEDC
20036	AF04(695)-588	Air Force
20037	AF04(695)-588	Reject
20038	AF04(695)-588	S-131
20039	AF04(696)-588	S-147
B1	AF04(695)-588	Case-Test
30101	AF04(695)-588	Hydroburst
30102	AF04(695)-588	Hydroburst
30103	AF04(695)-588	Test-Loads
30104	AF04(696)-588	*Test-AEDC
30105	AF04(695)-588	S-148
30201	NAS1-5883	S-150
30202	NAS1-5883	S-153
30203	NAS1-5883	Reject
30204	NAS1-5883	S-151
30205	NAS1-5883	Test-LRC
30206	NAS1-5883	S-152
30207	NAS1-5883	S-159
30208	NAS1-5883	Test
30209	NAS1-5883	***Reject
30210	NAS1-5883	S-158
30211	NAS1-5883	Case Rejected
30212	NAS1-5883	Case Rejected
30213	NAS1-5883	Case Rejected
2218-8(30214)	NAS1-5883	S-160
2218-9(30301)	NAS1-5883	Test-AEDC
2218-10(30302)	NAS1-5883	***S-161
2223-1	NAS1-5610	S-167
2223-2	NAS1-5610	S-168
2223-3	NAS1-5610	S-174
2223-4	NAS1-5610	S-165
2223-5	NAS1-5610	S-169
2223-6	NAS1-5610	S-172
2223-7	NAS1-5610	S-177
2223-8	NAS1-5610	S-144
2223-9	NAS1-5610	S-171
2223-10	NAS1-5610	S-175
2223-11	NAS1-5610	S-166
2223-12	NAS1-5610	S-183
2223-13	NAS1-5610	Assigned S-185
2223-14	NAS1-5610	S-173
2223-15	NAS1-5610	S-180
2223-16	NAS1-5610	S-163
2376-5	NAS1-7199	

---

*30104 Empty Case to S-144.

**Traded for X258E6-133.

***Replace 30209 with 2218-10(30302).

TABLE CXCVII - SCOUT MOTOR CONFIGURATION SUMMARY.

VEHICLE STAGE	*MOTOR NAME	MOTOR TYPE	SCOUT VEHICLE NUMBER S-138	S-139	S-140C	S-141C	S-142C	S-143C	S-144CR	S-145C	S-146C	S-147C	S-148C	S-149C	S-150C	S-151C	S-152C	S-153C	S-154C	S-155C	S-156C	S-157C	S-158C	S-159C	S-160C	S-161C	S-162C	S-163CR	S-164C	S-165C	S-166C	S-167C	S-168C	S-169C	S-170CR	S-171C	S-172C	S-173C	S-174C	S-175C	S-176C	S-177C
SPIN MOTORS	1.0KS75	--							4						2	2		2					2	2	2	2				2		2	2	2	2	2	2	2	2	2		2
	0.6KS40	--	2				4	2			2			2			2		2		2	2					2		2	2		2					2		2		2	
	1.0KS40	--	2	4	4	4		2	2	4	2	4	4	2	2	2	2	2	2	4	2	2	2	2	2	2	2						2	2		2		2		2	2	2
FIFTH-STAGE MOTOR	CETUS	NOTS 100 B				X																																				
FOURTH-STAGE MOTOR	ALTAIR I	X248-A5																																								
	ALTAIR II	X258-B1																																								
		X258-C1																																								
		X258-C2																																								
		X258-C3																																								
		X258-E4									X																															
		X258-E5																									X														X	
		X258-B6	X	X	X	X	X	X											X	X	X	X																				
	ALTAIR III	FW-4S							X	X		X	X		X	X	X	X					X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X		X
THIRD-STAGE MOTOR	ANTARES II	X259-A3	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X			X																		
		X259-B3							X													X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SECOND-STAGE MOTOR	CASTOR I	--	X	X		X																																				
	CASTOR IIA	--			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FIRST-STAGE MOTOR	ALGOL IIC																														X											
	ALGOL IIA	--																																								
	ALGOL IIB	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X
	ALGOL III																																		X							

Note: Spin Motor quantity shown.

(f) First-stage Moment Disturbances

Table CXCVIII and figures 59 through 62 show the pitch, yaw, and roll moment disturbances of phases IV and V vehicles. Each figure is extracted from the individual vehicle postflight report. These have been calculated using postflight telemetry, radar, and meteorological data and predicted aerodynamic characteristics. The residual moments reflect thrust misalinement, fin misalinement, data inaccuracy and errors in predicted aerodynamic data. An error was found in the jet vane lift effectiveness used prior to vehicles S-152C. The moment disturbances shown for vehicles S-152C through S-172C include corrected lower, jet vane effectiveness. The relatively large residual moments noticeable on all flights have been investigated further. These data were used to extract aerodynamic stability derivatives and control surface effectiveness. The extraction of flight characteristics shows even lower jet vane effectiveness, reduced aerodynamic static margin transonically, and a pitching moment coefficient at zero angle of attack due to the various vehicle protuberances. The residual moments have been calculated with the revised aerodynamic and jet vane data on vehicles S-160C and subsequent.

The first-stage moment disturbances on vehicles S-160C, S-161C, S-162C, and S-164C should not be representative of other vehicles due to changes in external lines. Vehicles S-160C, S-161C, and S-162C had two dummy Base "A" launch fitting fairings mounted on the range side of the vehicle which noticeably reduced the aerodynamic pitchup bias in the moments. Vehicle S-164C did not utilize a standard Scout heat shield because of the Reentry-F payload; the exterior nose shape of this payload was a long, pointed cone having a 5-degree half angle.

(g) Second- and Third-stage Thrust Misalinement and Moment Disturbances

The time histories of second- and third-stage pitch and yaw thrust misalinement and moment disturbance are presented in figure 62. Vehicle S-140C and vehicles S-142C and subsequent used the Castor II motor. On the Castor II motors the pitch thrust misalinement causes noseup moments whereas the direction of the yaw component of thrust misalinement is random. The thrust misalinement is based on the total moment disturbances and includes an effective thrust misalinement which accounts for aerodynamic moments. The aerodynamic effects are greatest at second-stage ignition and decrease with time as dynamic pressure decreases. The third stage has a tendency to pitch down and yaw left. Time histories of the statistically distributed pitch and yaw components of thrust misalinement based on 23, 13, 34, and 44 samples, respectively, are shown in figure 63. Total thrust misalinement magnitudes only are given in figure 64.

TABLE CXCVIII

SCOUT
FIRST-STAGE PITCH PROGRAM, MAXIMUM CONTROL SURFACE DEFLECTIONS AND ROLL TRANSIENTS

VEHICLE	PITCH AT LIFT-OFF		FIRST-STAGE PITCH PROGRAM				MAXIMUM CONTROL SURFACE DEFLECTIONS								ROLL TRANSIENTS AFTER IGNITION		
			MAXIMUM COMMANDED RATE		MAXIMUM PITCH CONTROL DEFLECTION DURING MAXIMUM RATE		PITCH				YAW						
							BOOST		COAST		BOOST		COAST				
	deg	Flt. Time sec	Rate deg/sec	Flt. Time sec	deg	sec	Defl. deg	Flt. Time sec	Defl. deg	Flt. Time sec	Defl. deg	Flt. Time sec	Defl. deg	Flt. Time sec	Max. Angle deg	Max. Mom't ft-lbs	Flt. Time sec
S-138	-0.16	2.4	-3.27	2.9 - 7.6	+15.9	4.5	+15.9	4.5	+16.0	79	+8.2	25	+13.0	76	+0.35		0.7
S-139	+0.37	2.6	-2.63	2.9 - 8.3	+13.1	4.0	+13.1	4.0	+10.5	75	+4.0	23.5	+11.0	79	+1.7		5
S-140C	+0.5	2.23	-2.5	2.9 - 7.9	+15.0	4.3	+15.0	4.3	+12.9	79.2	+8.0	30	+14.6	79.2	-1.36		5
S-141C	-0.27	2.77	-3.0	2.9 - 7.9	+7.5	4.0	+7.5	4.0	+7.3	73	-11.4	3	+3.3	70		-90	3
S-142C	+0.27	2.8	-2.52	2.9 - 8.95	+12.0	4.0	+12.0	4.0	+8.4	69	+7.0	33	+14.0	79	-0.75		5
S-143C	-0.26	0.24	-2.43	2.9 - 8.39	+11.5	4.5	+11.5	4.5	+8.2	77	+3.5	13	+11.3	79		+117	1
S-144CR	-0.17	0.15	-1.48	3.0 - 7.49	+4.2	4.4	+4.2	4.4	+4.1	54.3	+2.5	34	-1.7	75		+40	0.5
S-145C	-0.17	1.88	-2.96	2.9 - 7.91	+12.5	4.4	+12.5	4.4	+6.4	85.4	+3.9	31.5	+4.7	84		+80	0.7
S-146C	+0.45	2.7	-2.42	2.9 - 7.9	+12.5	4.2	+12.5	4.2	+7.5	75	-4.0	21.2	+3.7	75		+202	3.4
S-147C	-0.12	0.18	-3.0	2.9 - 7.9	+12.6	4.3	+12.6	4.3	+5.5	81	+10.1	22.3	+3.0	78		-66	3.2
S-148C	+0.2	2.7	-2.91	2.91 - 7.91	+14.0	4.3	+14.0	4.3	+8.4	76	+2.7	21.0	-5.5	82.5		+101	3
S-149C	0.0	--	-2.45	2.98 - 7.97	+12.6	4.3	+12.6	4.3	+4.5	77	+4.20	12.7	-3.8	77		-40	1
S-150C	+0.15	2.8	-3.05	2.98 - 7.99	+14.7	4.3	+14.7	4.3	+8.2	75	+3.5	26	+6.9	77		+162	1
S-151C	+0.35	2.0	-2.82	2.99 - 7.99	+12.7	4.4	+12.7	4.4	+8.7	72	+13.3	27	+5.7	80.9		+225	0.5
S-152C	-0.46	2.37	-2.49	2.98 - 7.98	+12.6	5.0	+12.6	5.0	+4.1	70.5	+10.7	28	-2.0	75		+100	1.0
S-153C	None		-2.96	2.97 - 7.97	+10.5	4.1	+10.5	4.1	+7.7	59	+5.5	5.3	-2.5	58.5			
S-154C	+0.54	2.88	-2.62	2.98 - 8.07	+13.7	4.5	+13.7	4.48	+5.87	76	+9.59	34.5	+1.05	76		+130	
S-155C	-0.26	2.50	-3.62	2.97 - 7.97	+19.1	4.5	+19.1	4.5	+6.14	81	+4.48	28	+8.99	80.5		+115	0.5
S-156C	-0.43	--	-2.60	2.97 - 7.97	+10.2	4.5	+10.2	4.5	+8.7	65	-2.4	21.5	+1.6	74.0		+58	0.5
S-157C	-0.20	2.20	-2.46	2.98 - 7.93	+13.5	4.5	+13.5	4.5	+6.3	75.5	+7.6	31.0	+3.1	64.0		+191	3.0
S-158C	-0.23	2.79	-2.69	2.97 - 7.97	+8.7	4.5	+8.7	4.5	+5.9	64.0	+11.3	27.5	+5.2	79.5		+103	1.8
S-159C	+1.13	2.80	-2.83	2.99 - 8.05	+19.7	4.5	+19.7	4.5	+6.7	74.5	+4.7	35.9	-4.2	59.8		+114	0.5
S-160C	-0.17	1.87	-2.47	2.99 - 7.67	+16.8	4.5	+16.8	51.0	+18.7	54.0	-8.3	51.2	-6.0	63.0		+66	0.7
S-161C	-0.39	2.74	-2.22	3.00 - 8.00	+11.5	5.0	+11.5	5.0	+5.0	73.0	+7.9	34.5	+7.1	71.5		+84	0.5
S-162C	-0.35	2.38	-2.44	2.99 - 7.69	+9.4	4.5	-12.0	24.5	+2.4	73.0	-7.3	24.0	+8.6	70.0		+45	2.0
S-163CR	+2.98	2.50	-2.44	1.00 - 5.74	+10.2	2.5	+10.2	2.5	+10.0	62.5	-4.3	22.5	+4.0	73.5		-83	0.5
S-164C	+1.77	2.98	-2.99	2.43 - 7.78	+13.0	3.8	+13.0	3.8	+8.6	70.4	+11.3	29.5	+7.7	81.0		+170	3.0
S-165C	-0.28	0.51	-2.64	3.00 - 8.00	+11.9	4.5	+11.9	4.5	+5.7	67.0	+4.1	22.5	-4.5	74.5		+25	0.5
S-166C	-0.23	0.15	-1.14	3.00 - 8.03	+2.9	4.2	+5.9	44.5	+7.2	66.0	+7.0	33.0	+1.2	57.2		-90	2.0
S-167C	+0.50	2.21	-2.74	3.00 - 8.00	+10.5	4.4	+10.5	4.4	+7.1	72.5	+3.9	13.4	+3.1	72.0		-30	1.5
S-168C	+0.48	2.02	-2.79	3.00 - 8.00	+11.9	4.5	+11.9	4.5	+6.0	50.0	-7.2	16.5	+2.1	49.5		-130	3.0
S-169C	-0.32	2.80	-2.63	2.99 - 7.99	+8.3	4.5	+8.3	4.5	+9.1	75.5	-3.9	13.5	+10.4	76.5		-135	0.5
S-170CR	-2.48	0.59	-2.13	1.00 - 5.69	+7.5	2.0	+7.5	2.0	+5.8	79.5	+6.3	12.4	+1.9	82.5		-200	0.5
S-171C	-0.15	0.20	-2.46	3.00 - 7.91	+7.4	4.7	+10.0	37.3	+8.3	75.5	+6.3	12.0	+1.9	73.4		-42	1.3
S-172C	-0.21	0.15	-2.07	3.00 - 8.00	+10.2	5.0	+10.2	5.0	+5.8	71.0	+2.9	47.0	+3.3	70.0		-28	1.5

VEHICLE	PITCH AT LIFT-OFF		FIRST-STAGE PITCH PROGRAM				MAXIMUM CONTROL SURFACE DEFLECTIONS								ROLL TRANSIENTS AFTER IGNITION		
			MAXIMUM COMMANDED RATE		MAXIMUM PITCH CONTROL DEFLECTION DURING MAXIMUM RATE		PITCH				YAW						
							BOOST		COAST*		BOOST		COAST*				
	DEG.	FLIGHT TIME SEC.	RATE DEG/SEC.	FLIGHT TIME SEC.	DEG.	SEC.	DEFL. DEG.	FLIGHT TIME SEC.	DEFL. DEG.	FLIGHT TIME SEC.	DEFL. DEG.	FLIGHT TIME SEC.	DEFL. DEG.	FLIGHT TIME SEC.	MAX. ANGLE DEGREES	MAX. MOM'T FT-LBS.	FLIGHT TIME SEC.
S-173C	-0.51	0.15	-2.92	3.00 - 7.00	+9.8	4.5	+9.8	4.5	+8.4	68.0	+8.1	15.2	+7.2	83.5	-	-112	1.0
S-174C	+0.11	1.50	-3.12	3.00 - 8.02	+10.0	4.5	+10.0	4.5	+9.8	77.0	-2.9	37.5	+3.9	74.5	-	- 95	0.5
S-175C	+0.28	0.40	-2.44	3.00 - 8.00	+7.2	4.8	+7.2	4.8	+8.9	67.5	+2.9	30.0	-4.2	79.0	-	N/A	N/A
S-176C	-0.11	0.10	-2.29	3.00 - 7.99	+12.80	4.9	+12.8	4.9	+8.20	71.0	-3.50	29.5	+1.70	51.8	-	+ 90	3.5
S-177C	+0.16	1.20	-2.75	3.00 - 7.90	+8.5	4.5	+8.5	4.5	+4.6	48.5	+4.5	6.5	-3.1	72.5	-	+ 16	0.5

RATES & DISPLACEMENTS:
PITCH, +=NOSE UP
YAW, +=NOSE RIGHT
ROLL, +=CLOCKWISE(viewed from rear)

CONTROL SURFACE DEFLECTIONS:
PITCH, +=TRAILING EDGE DOWN
YAW, +=TRAILING EDGE LEFT

MOMENT DISTURBANCE:
ROLL, +=CLOCKWISE(viewed from rear)

* COAST REFERS TO AFTER WEB BURN TIME

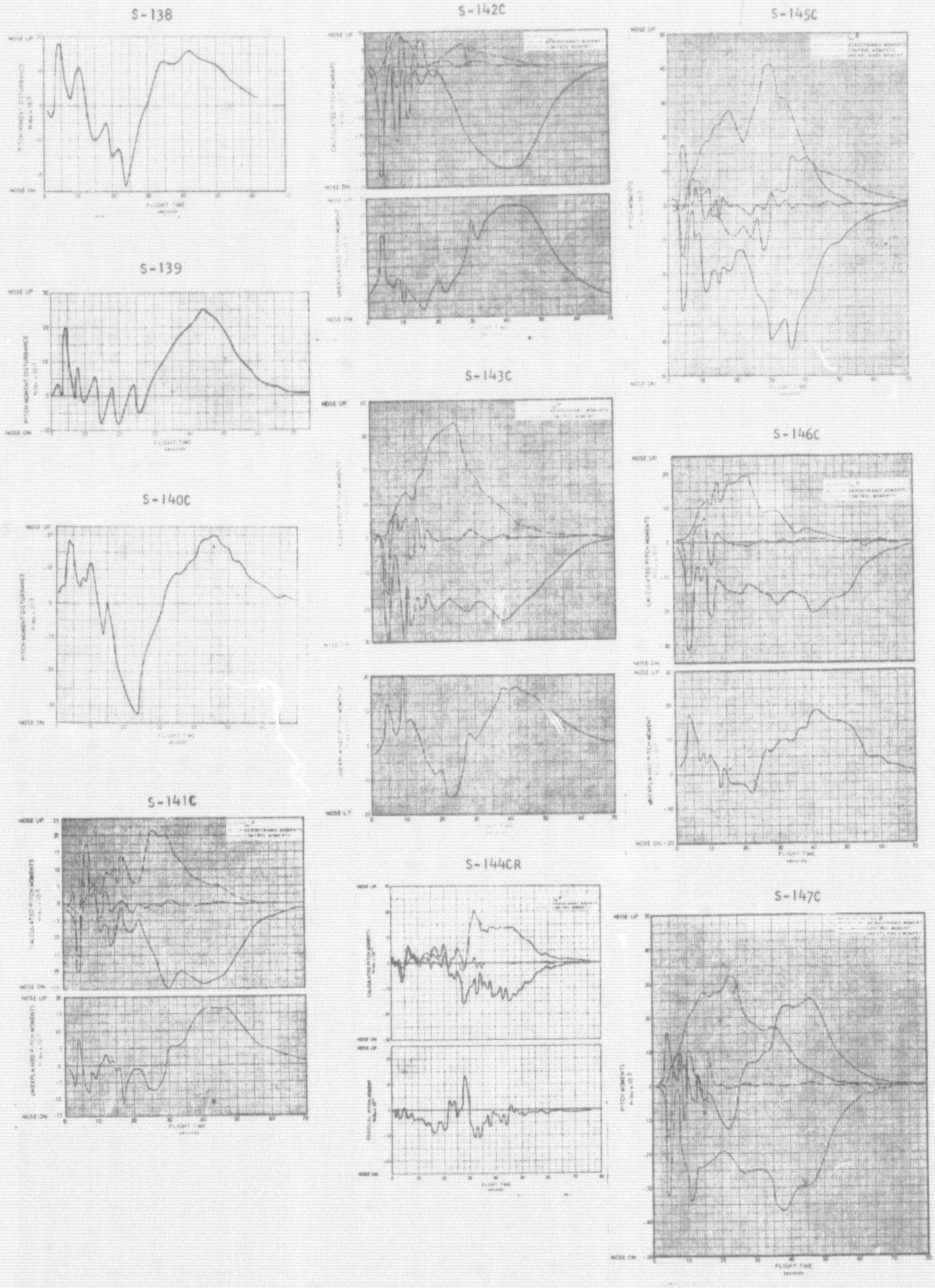
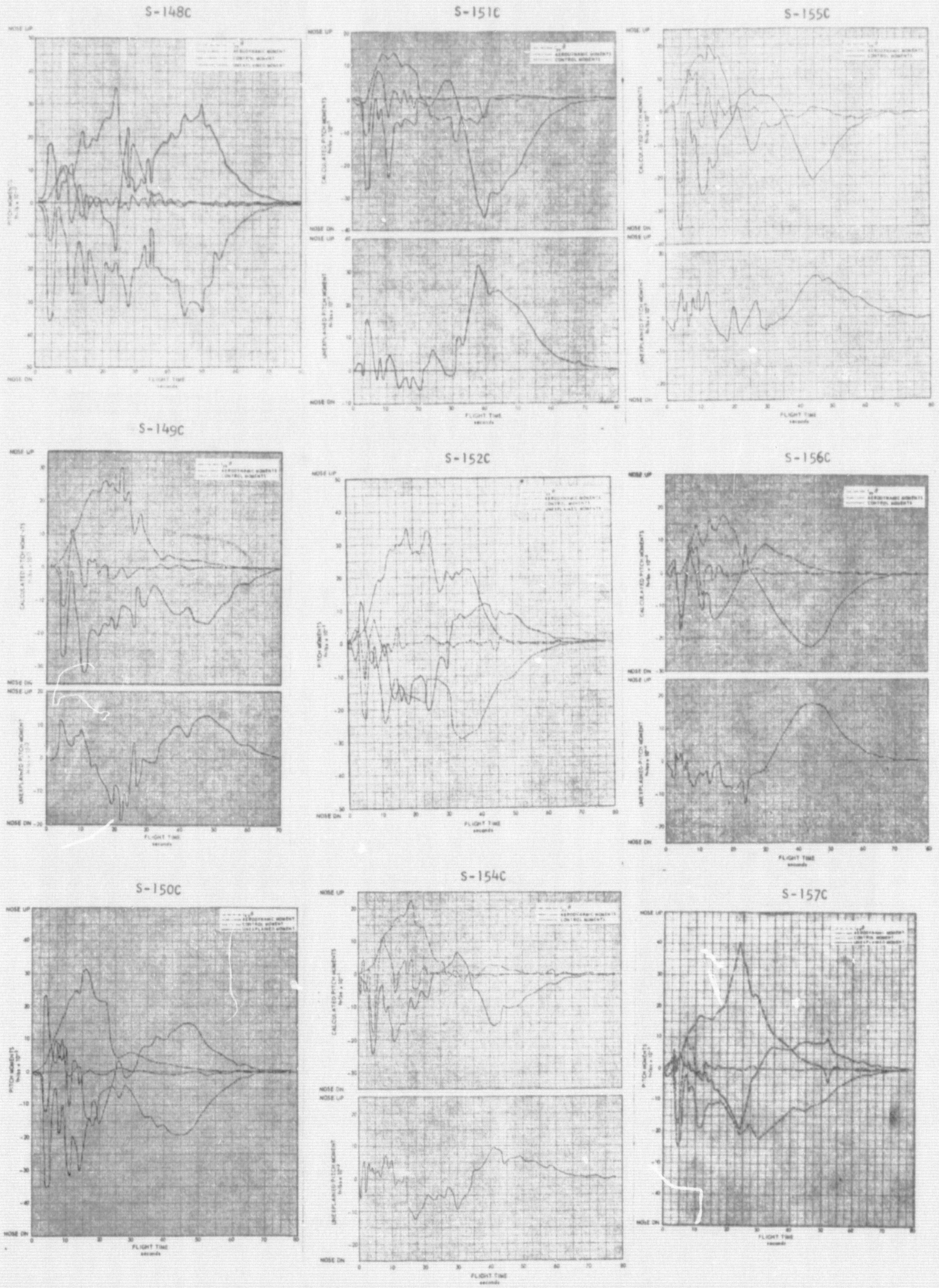


Figure 59.- Scout first-stage PITCH moment disturbances.



S-148C

S-151C

S-155C

S-149C

S-152C

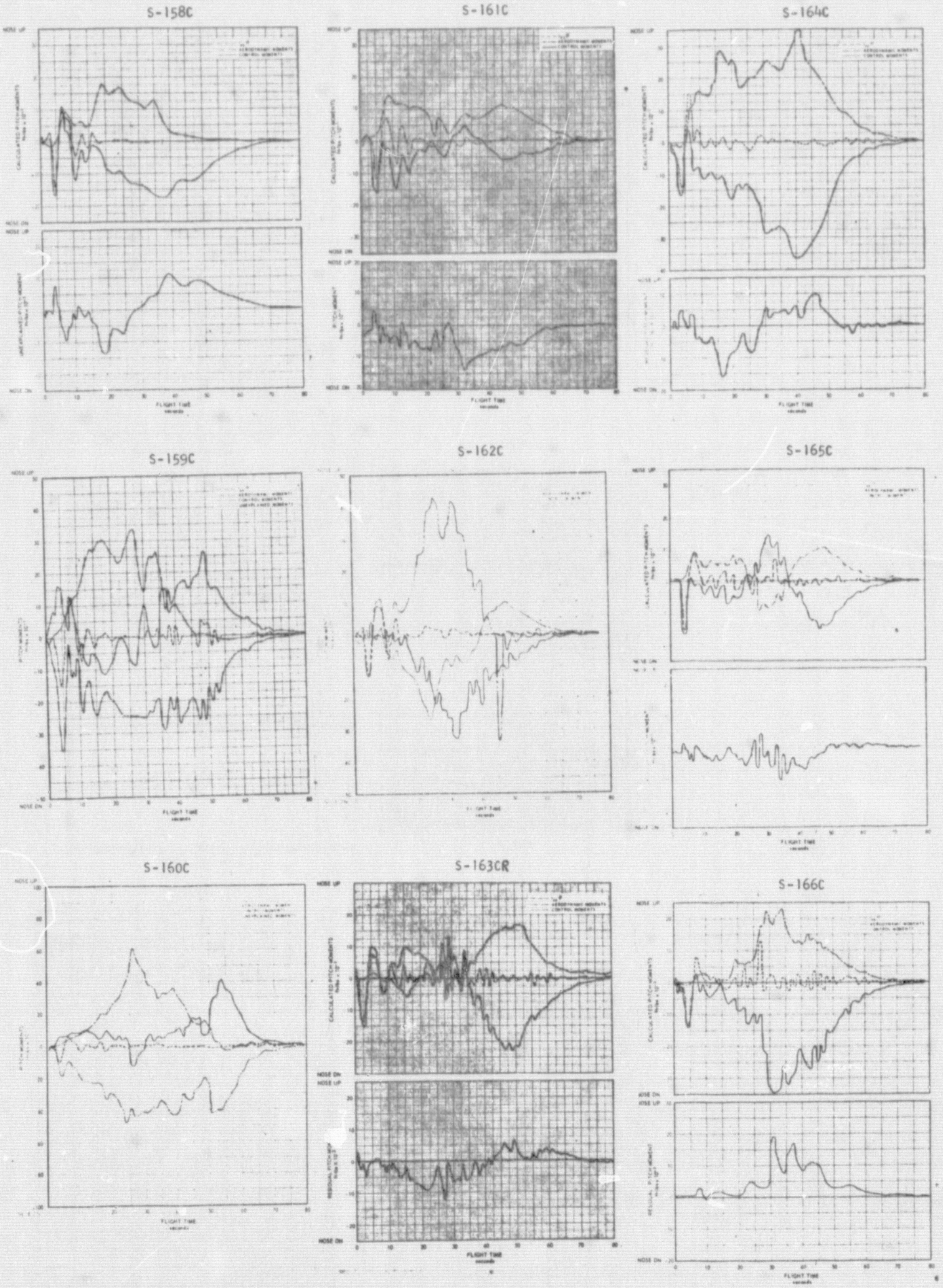
S-156C

S-150C

S-154C

S-157C

Figure 59 Continued.- Scout first-stage PITCH moment disturbances.

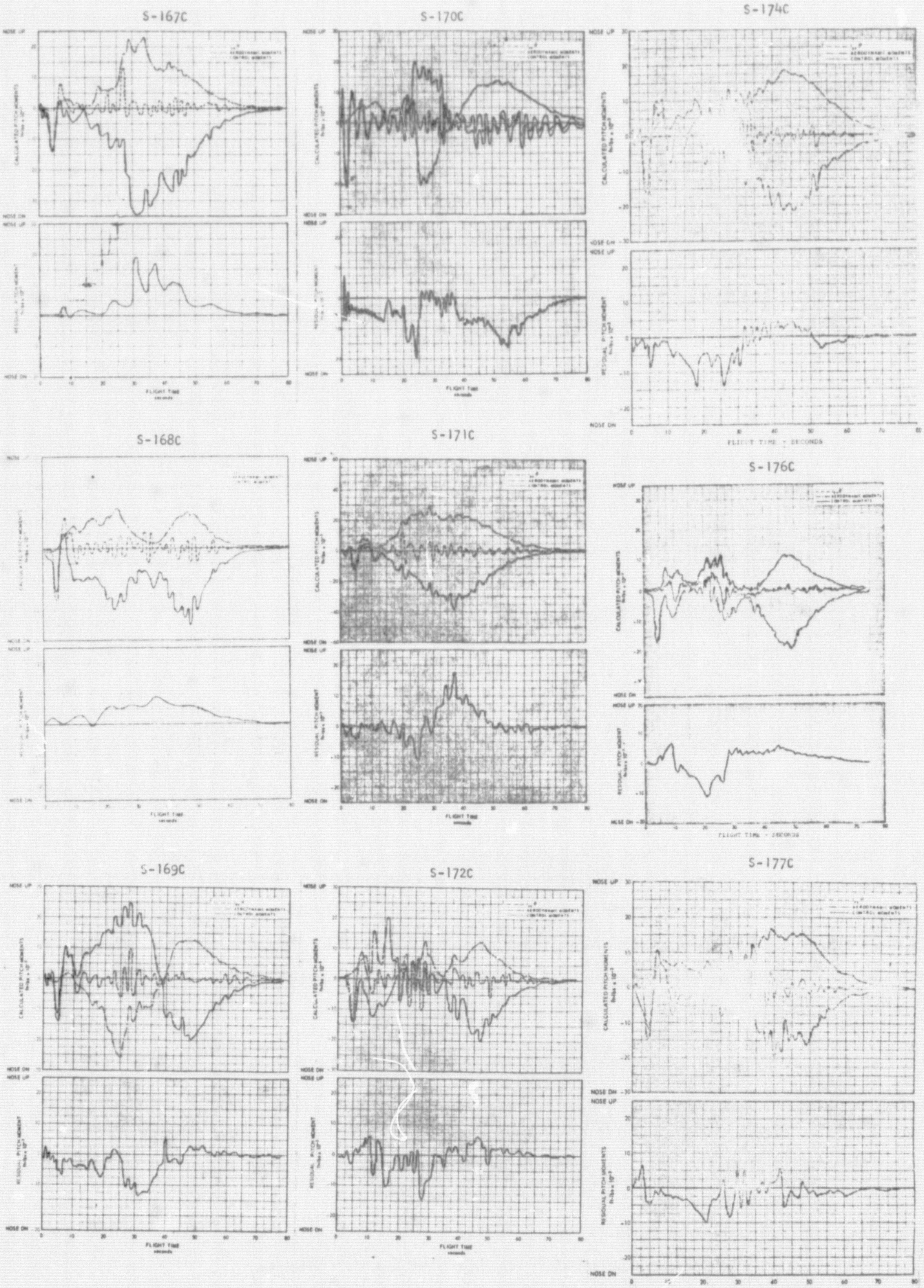


S-158C S-161C S-164C

S-159C S-162C S-165C

S-160C S-163CR S-166C

Figure 59 Continued.- Scout first-stage PITCH moment disturbances.



S-167C

S-170C

S-174C

S-168C

S-171C

S-176C

S-169C

S-172C

S-177C

Figure 59 Concluded.- Scout first-stage PITCH moment disturbances.

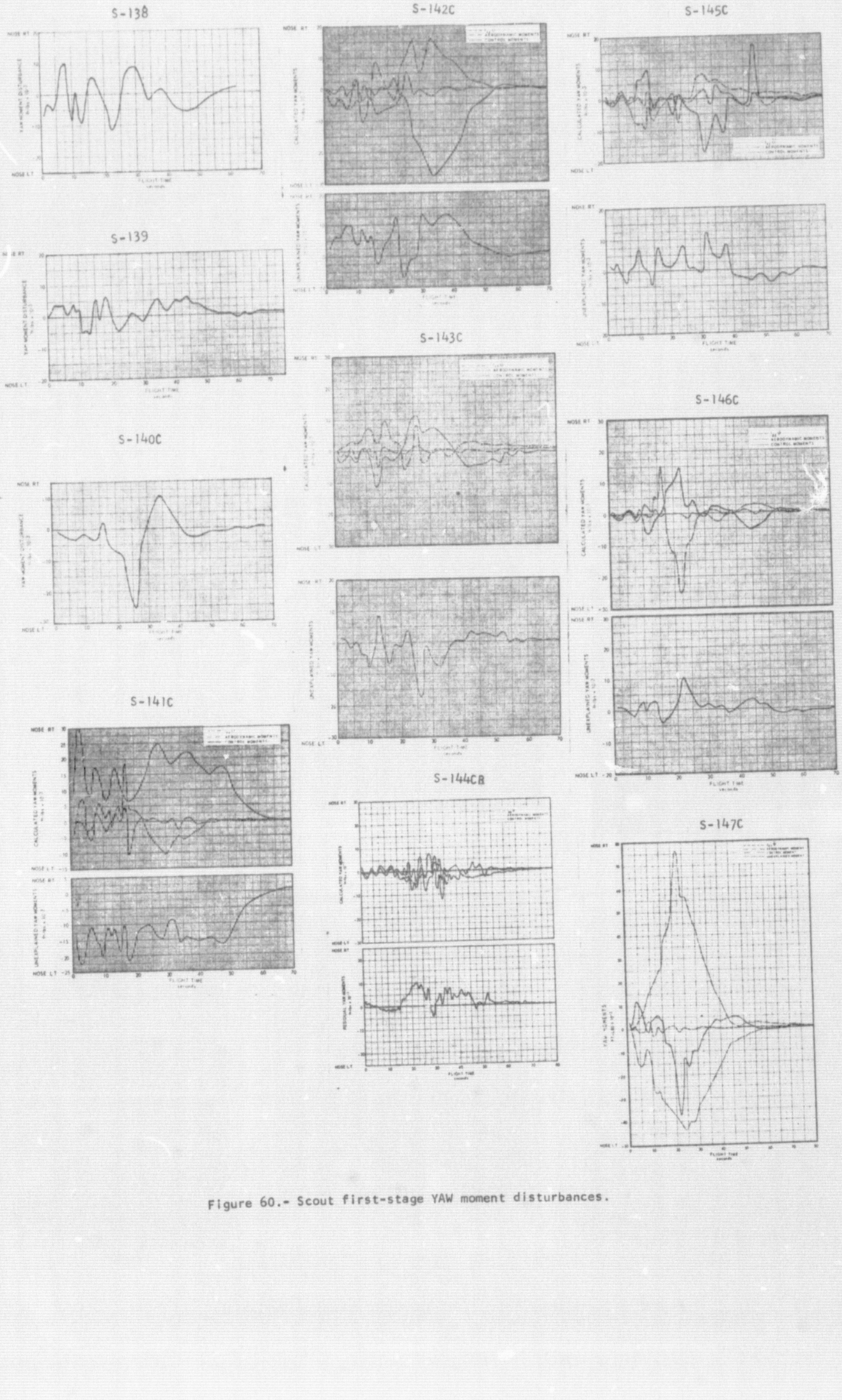
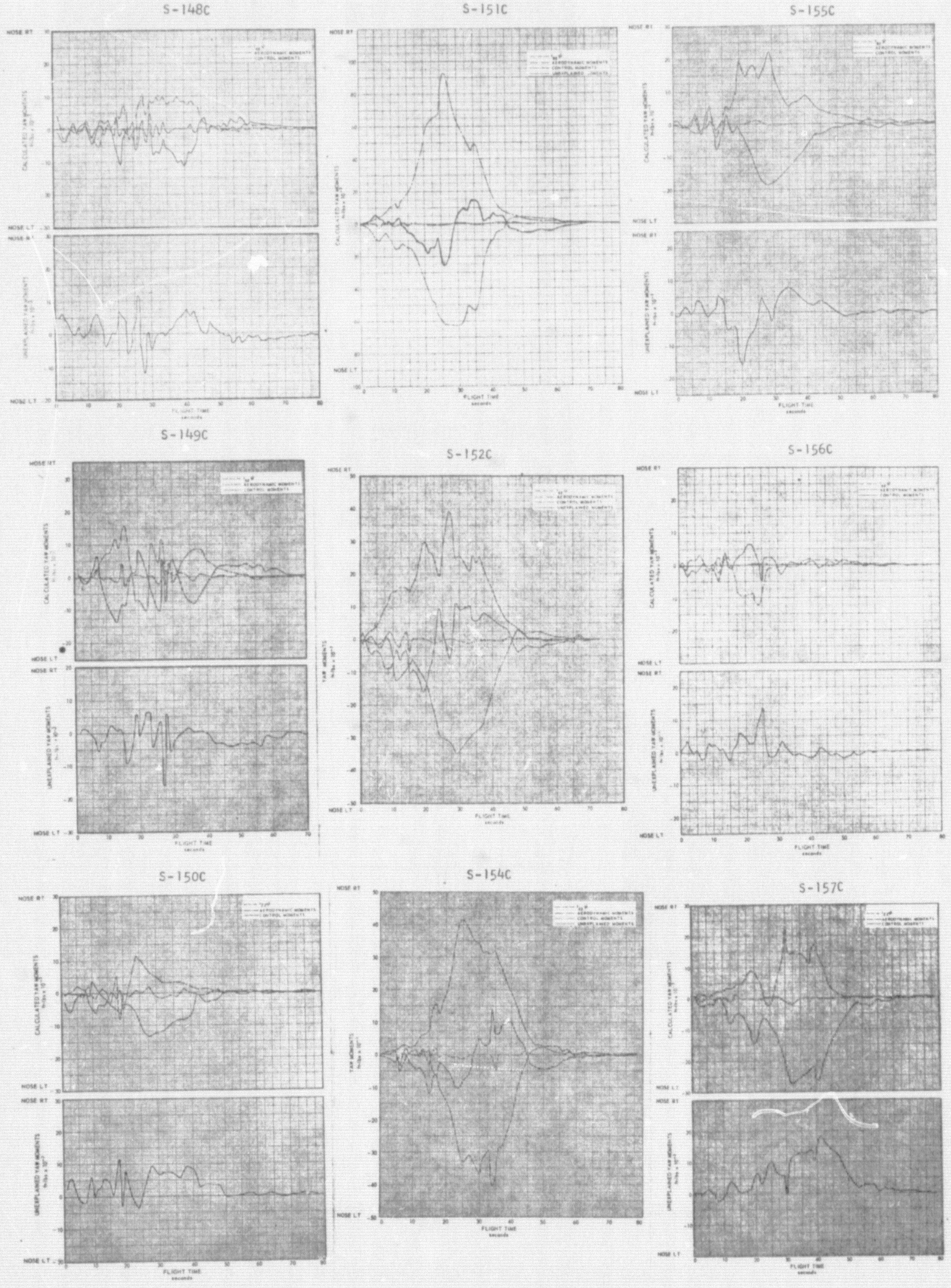


Figure 60.- Scout first-stage YAW moment disturbances.


S-148C

S-151C

S-155C

S-149C

S-152C

S-156C

S-150C

S-154C

S-157C

Figure 60 Continued.- Scout first-stage YAW moment disturbances.

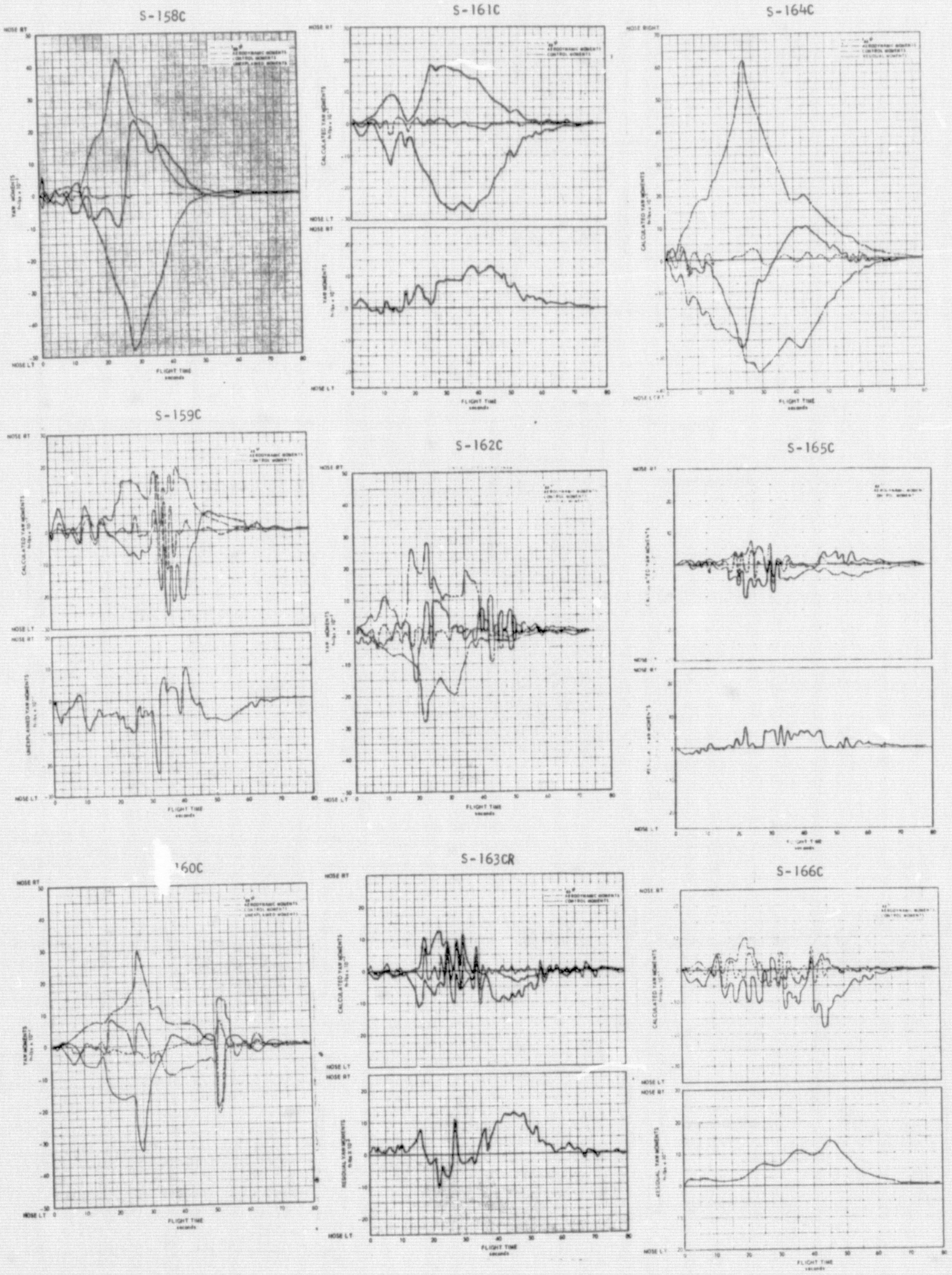


Figure 60 Continued.- Scout first-stage YAW moment disturbances.

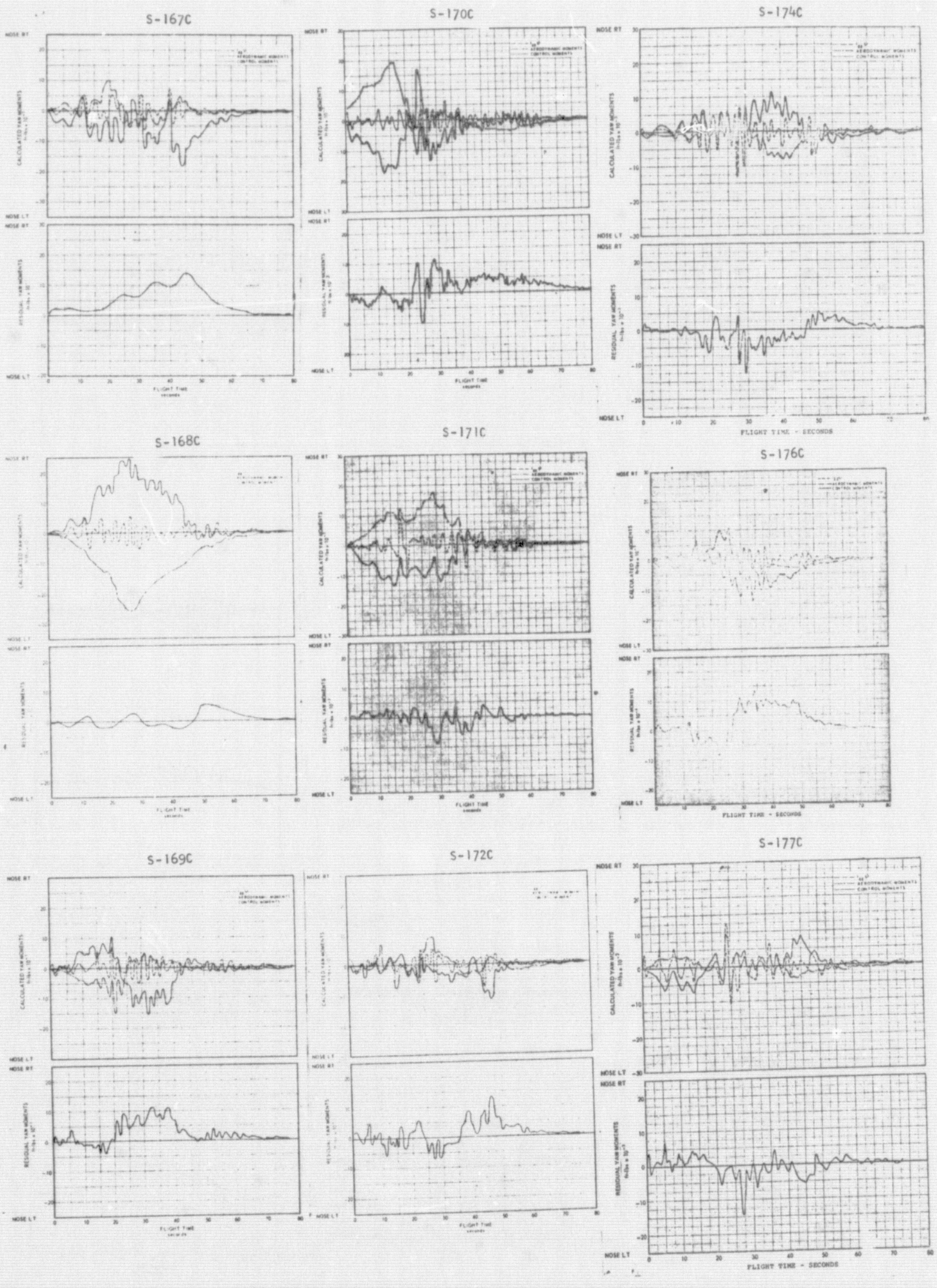
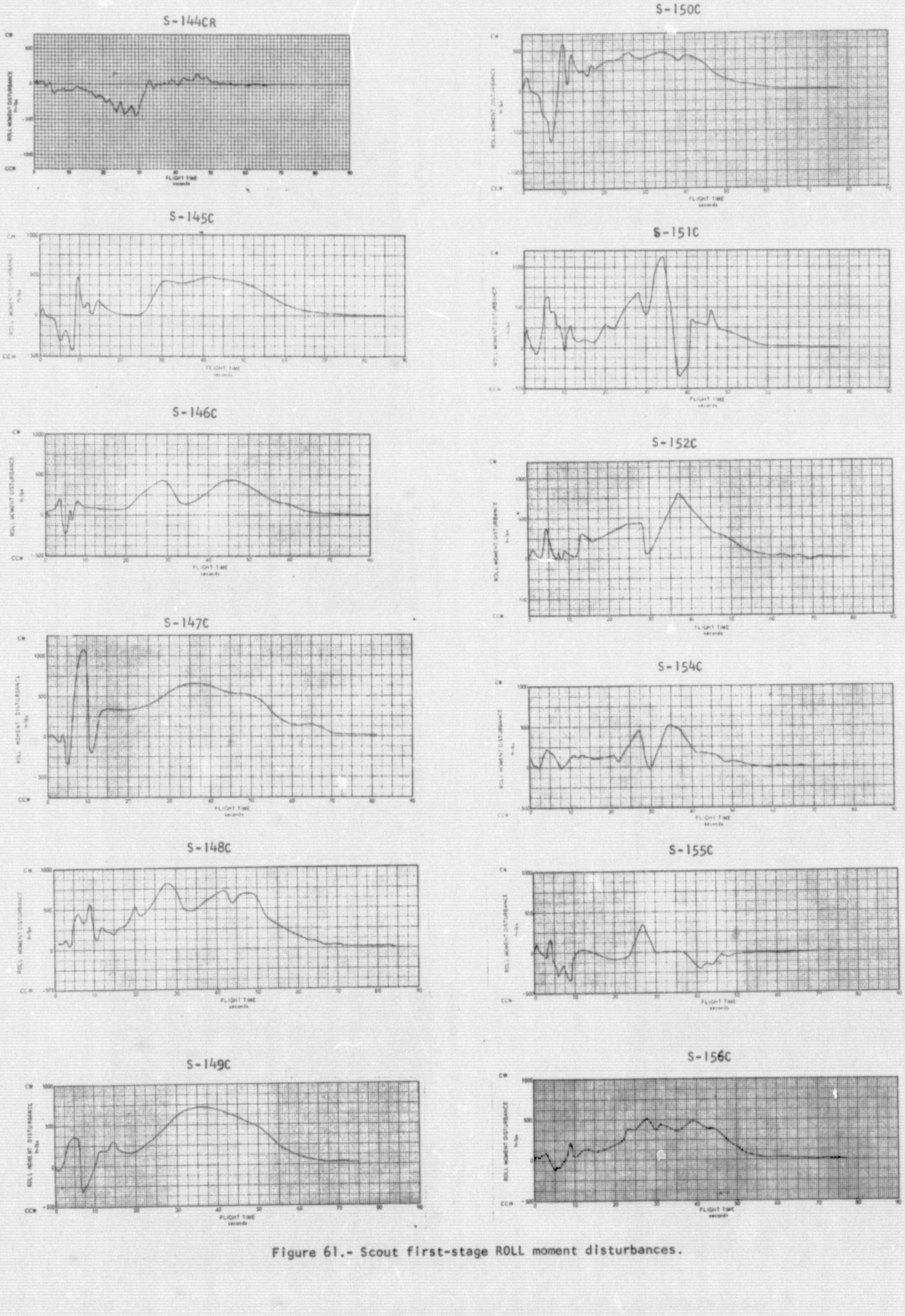


Figure 60 Concluded.- Scout first-stage YAW moment disturvances.


S-144CR

S-145C

S-146C

S-147C

S-148C

S-149C

S-150C

S-151C

S-152C

S-154C

S-155C

S-156C

Figure 61.- Scout first-stage ROLL moment disturbances.

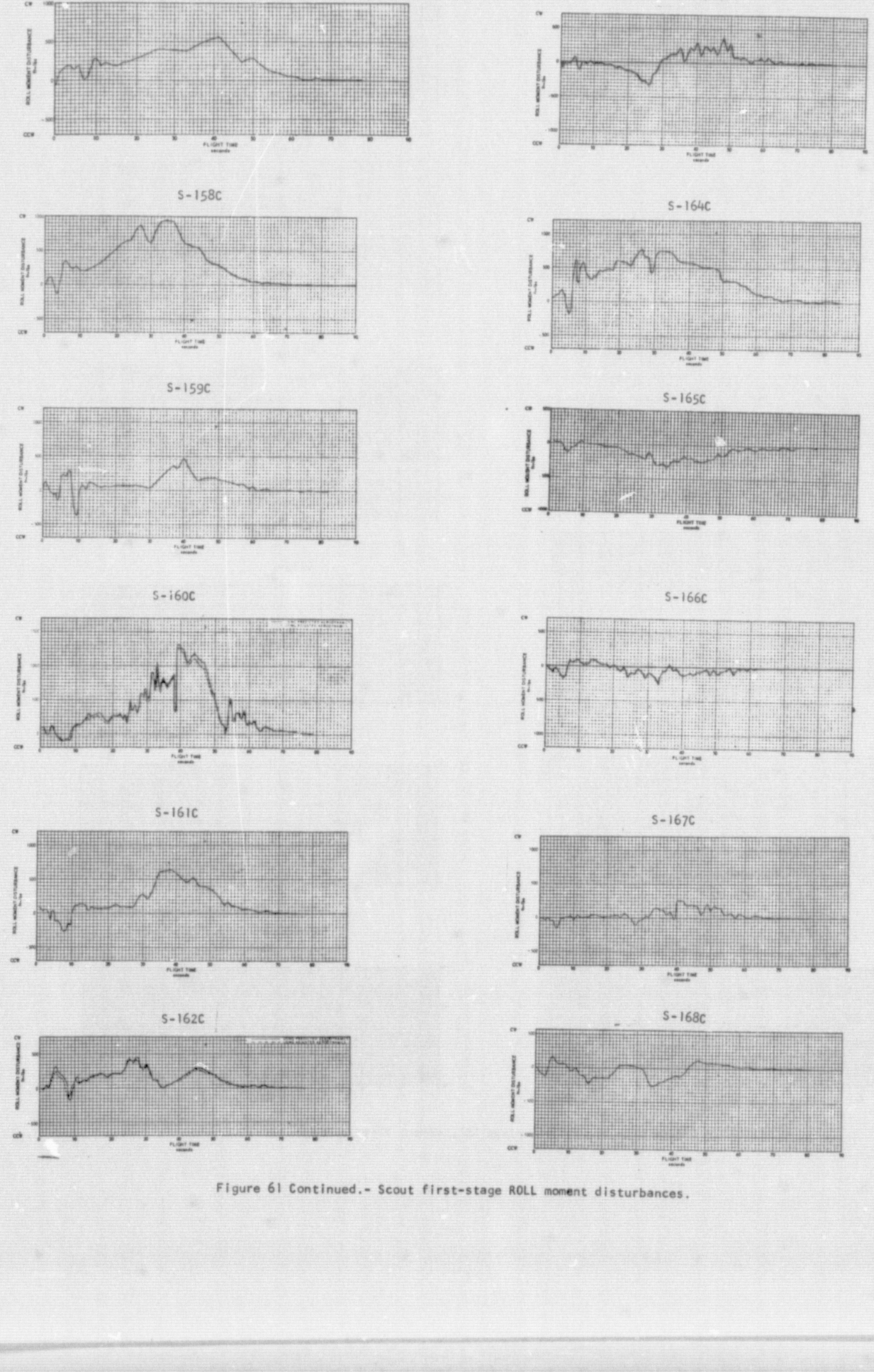
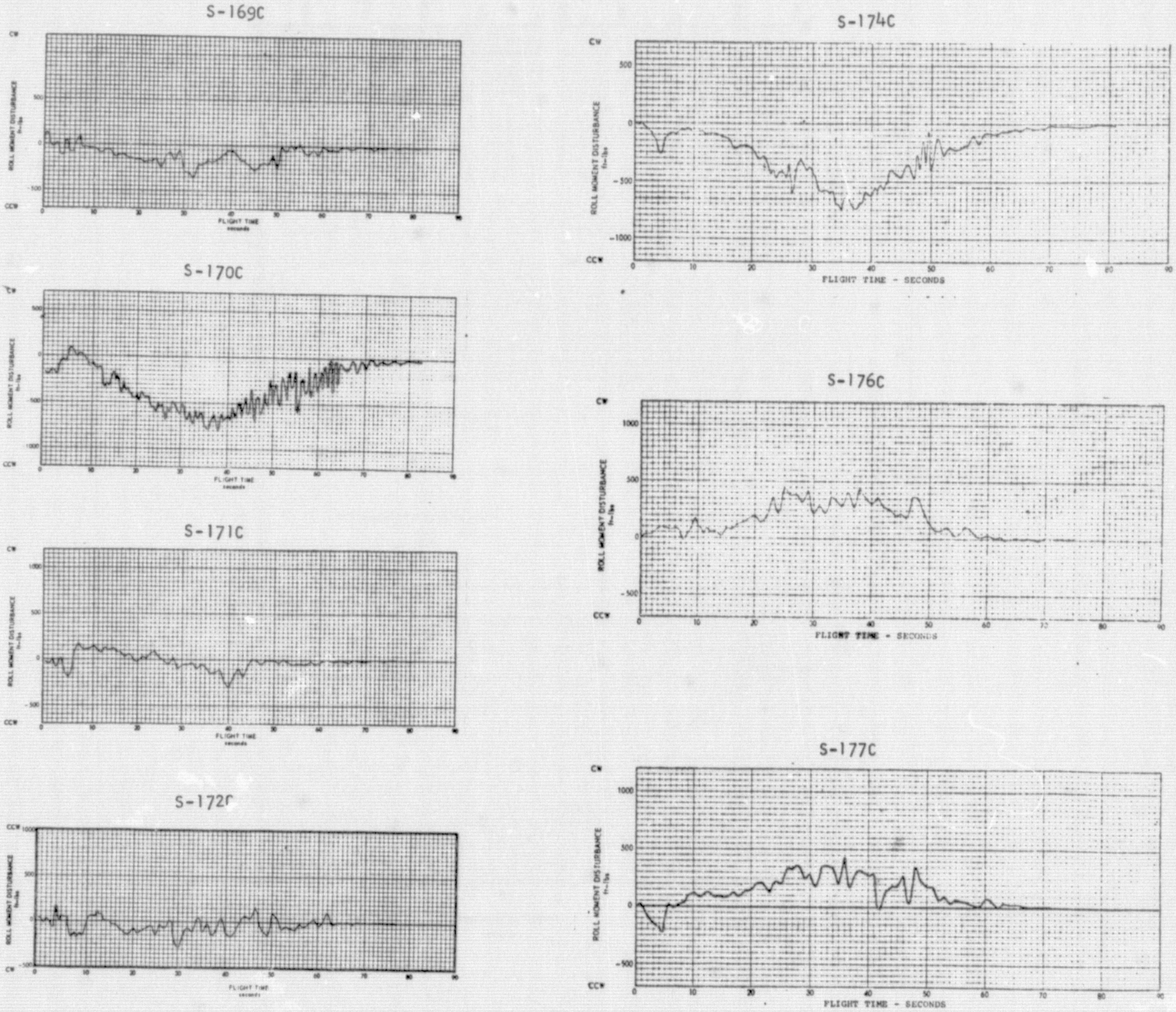


Figure 61 Continued.- Scout first-stage ROLL moment disturbances.



S-169C

S-170C

S-171C

S-172C

S-174C

S-176C

S-177C

Figure 61 Concluded.- Scout first-stage ROLL moment disturbances.

(a) S-138

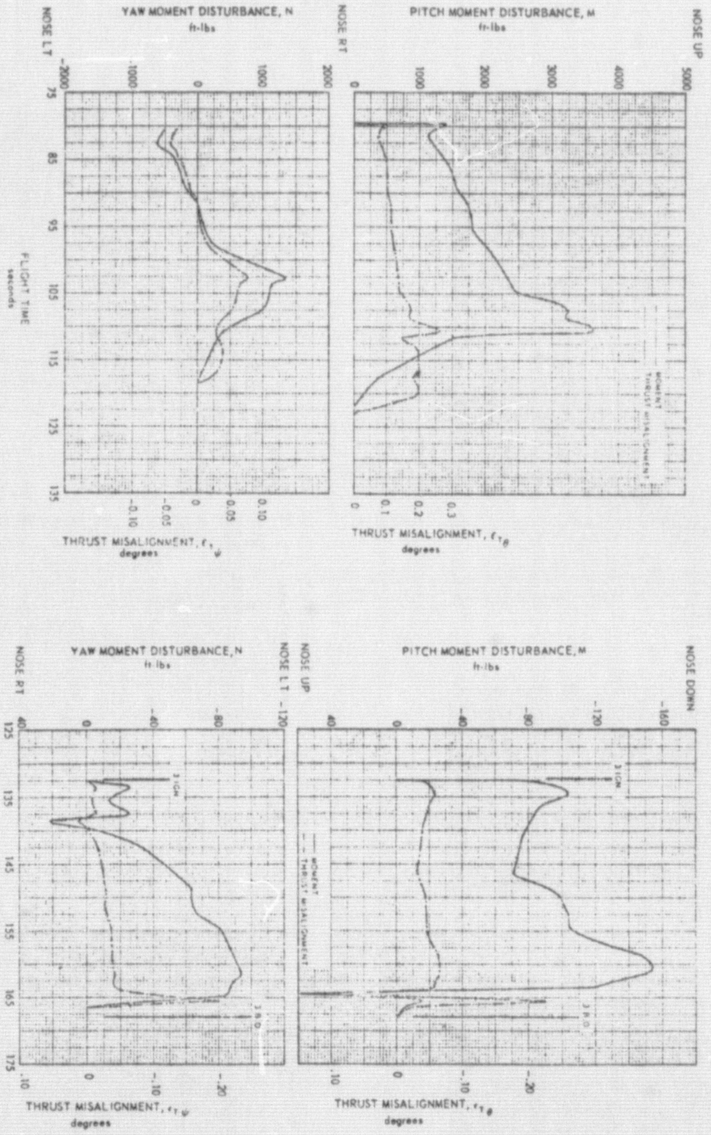
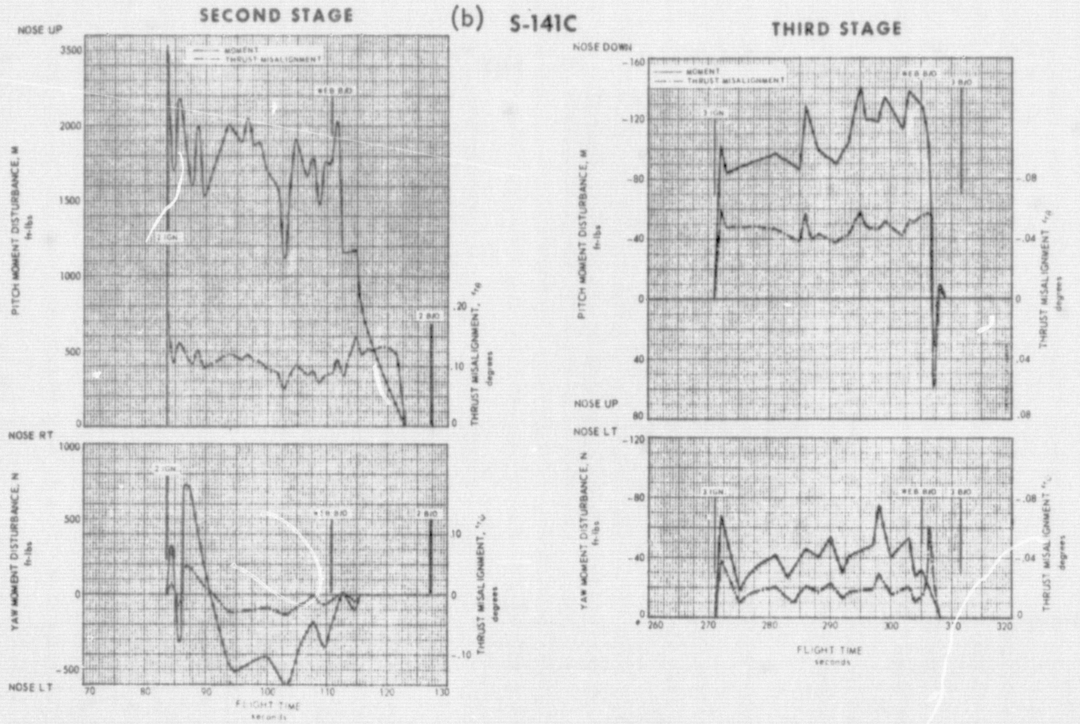


Figure 62.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(b) S-141C



(c) S-142C

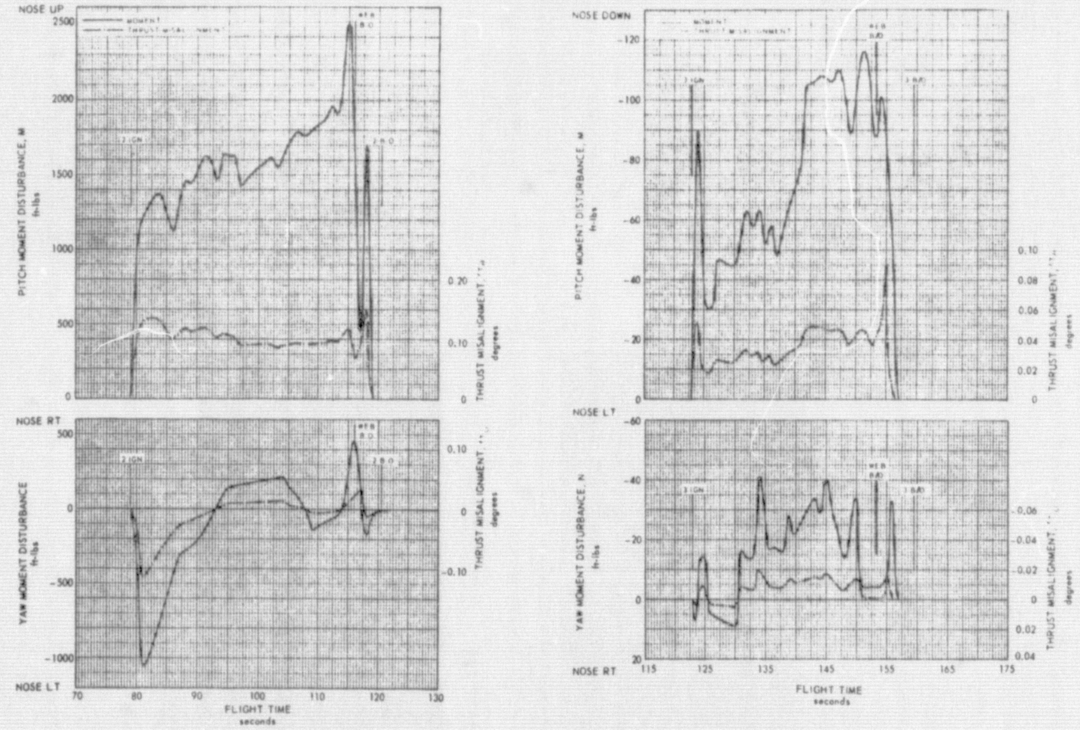
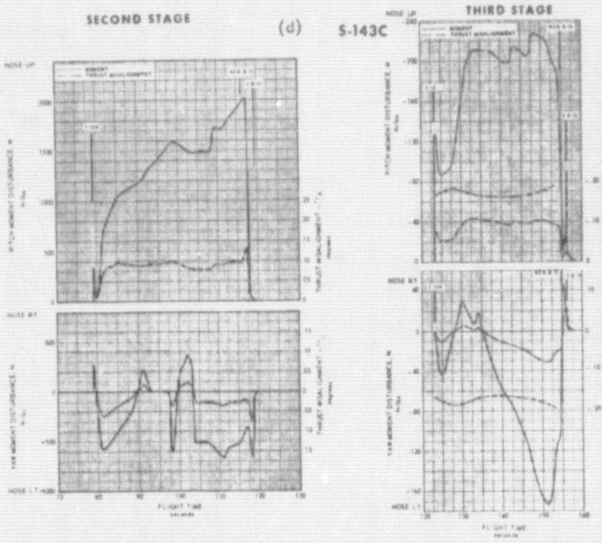


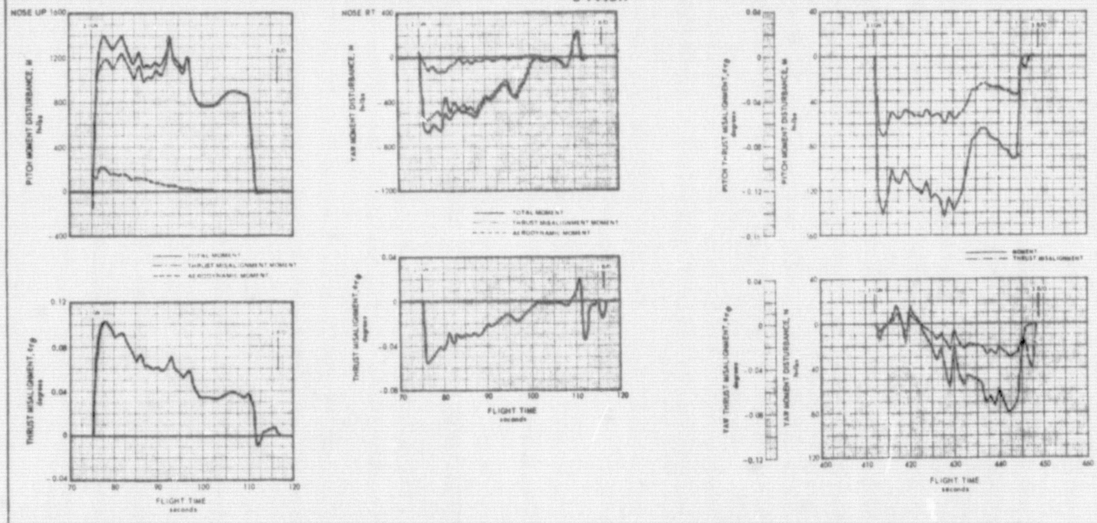
Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(d) S-143C



(e) S-144CR

Rev. B



(f) S-145C

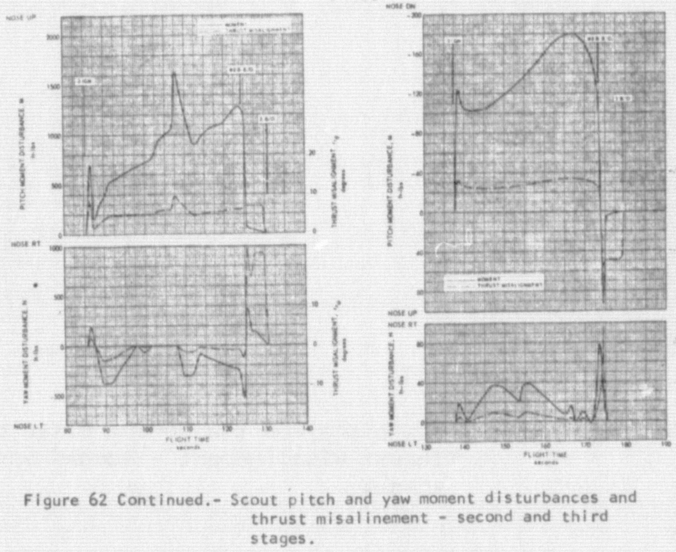
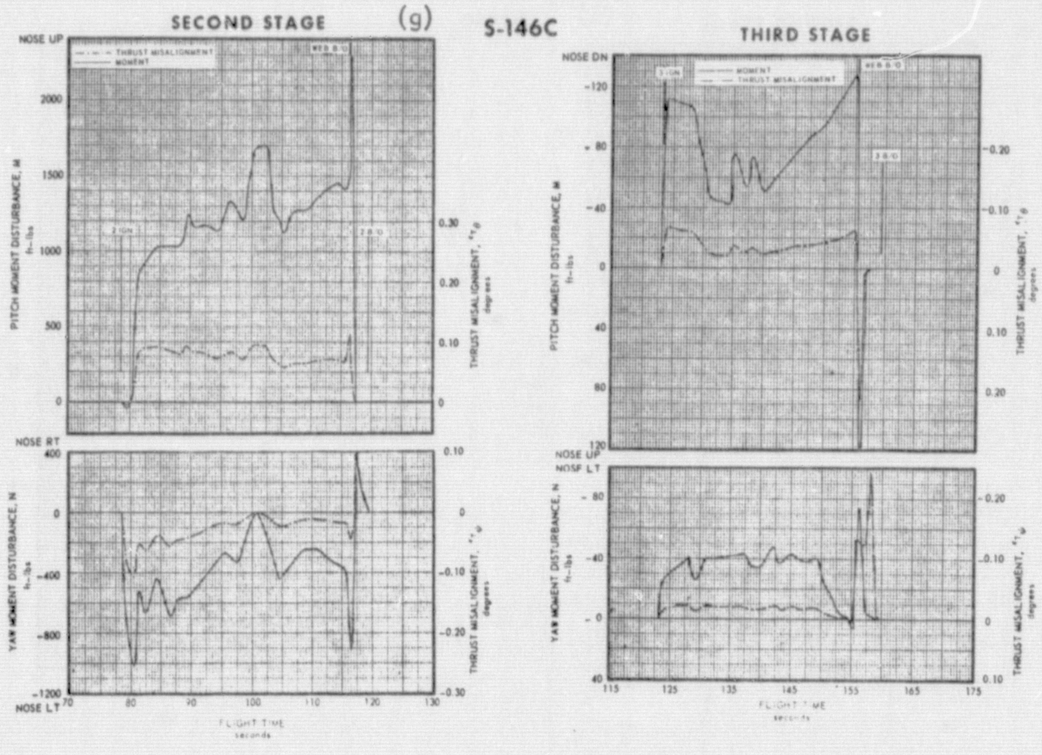


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(g) S-146C



(h) S-147C

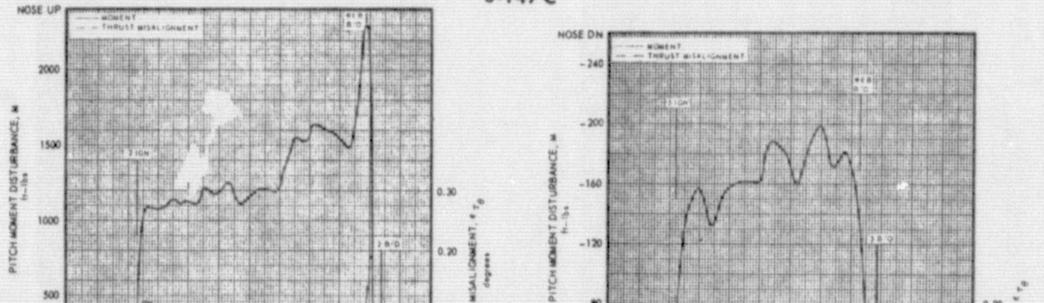
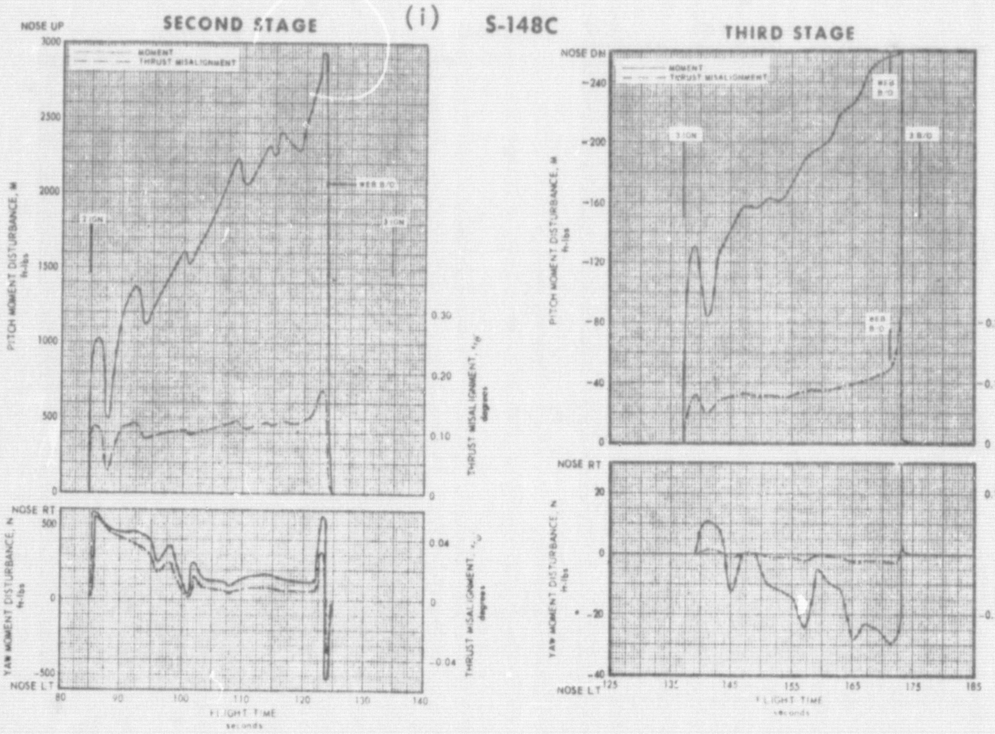


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(i) S-148C



(j) S-149C

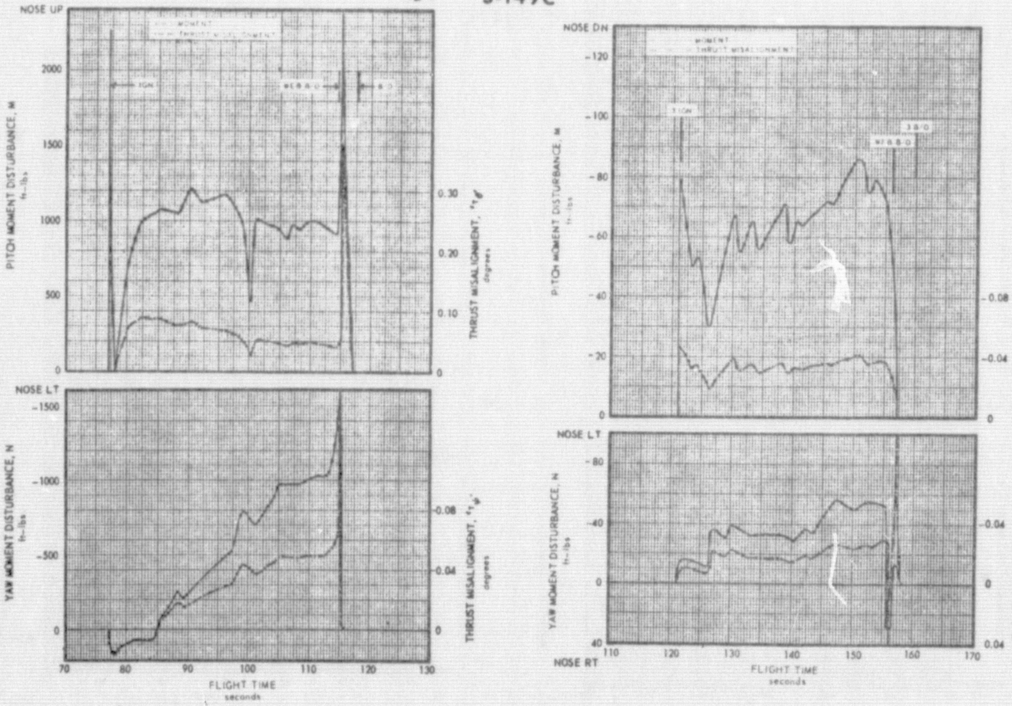
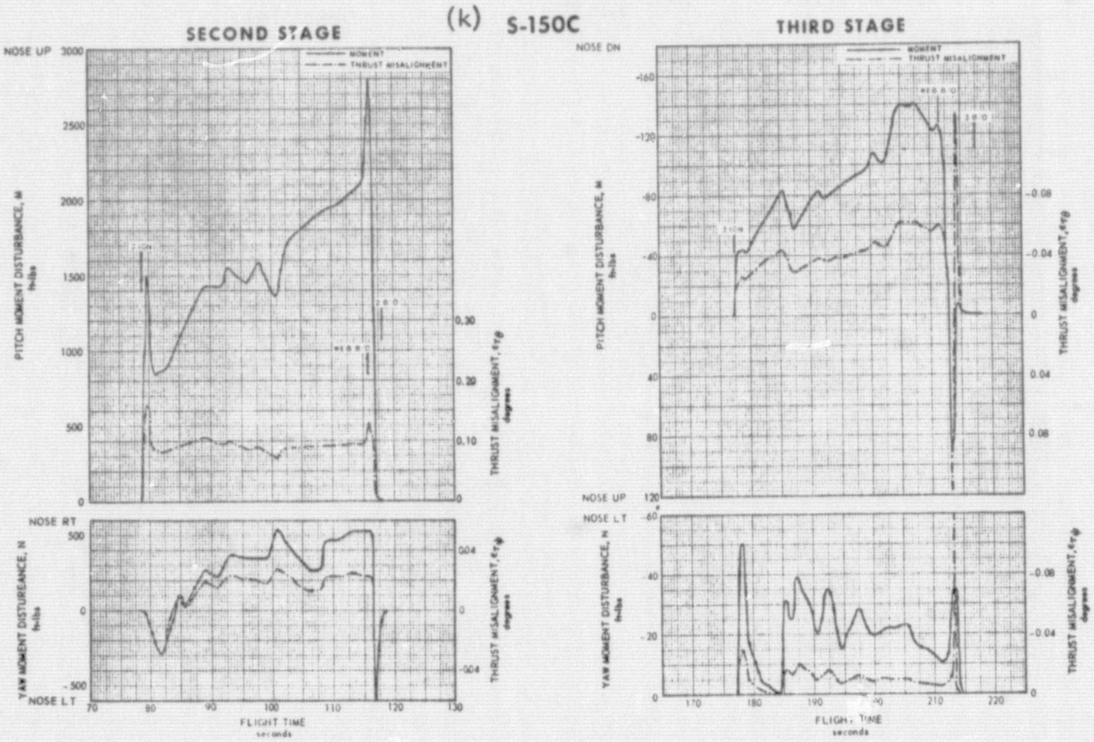


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(k) S-150C



(l) S-151C

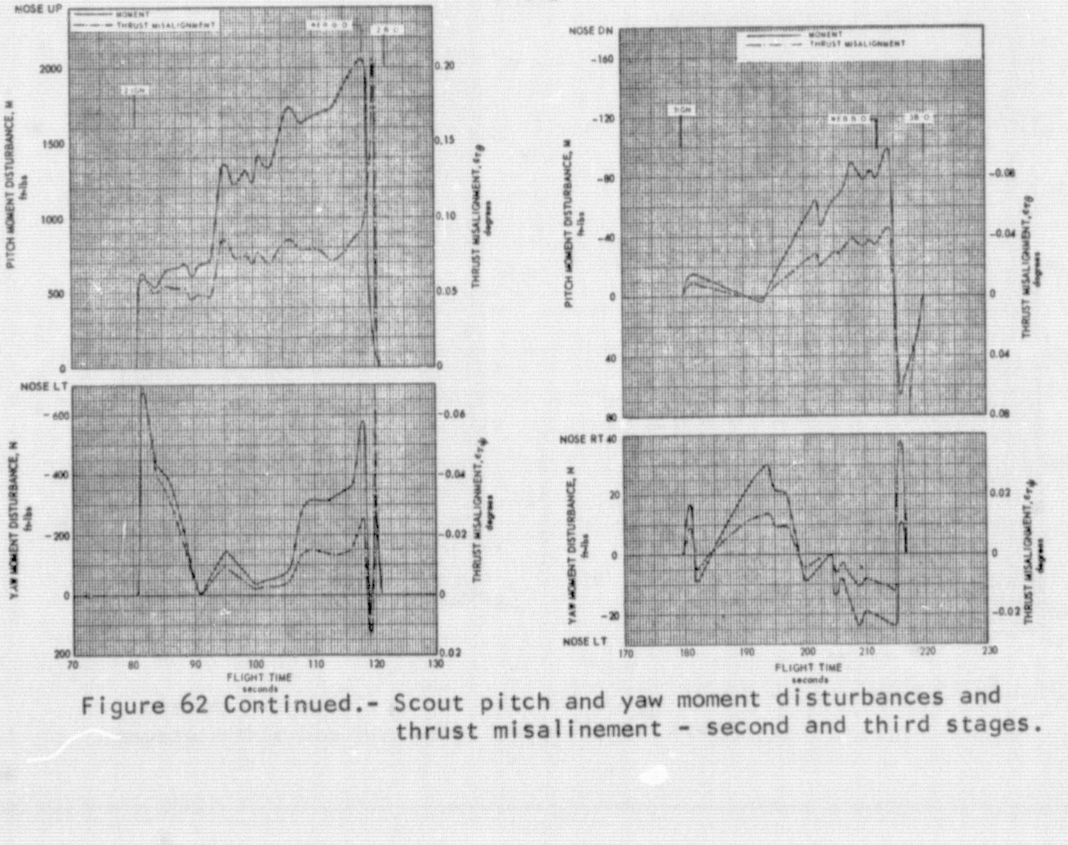
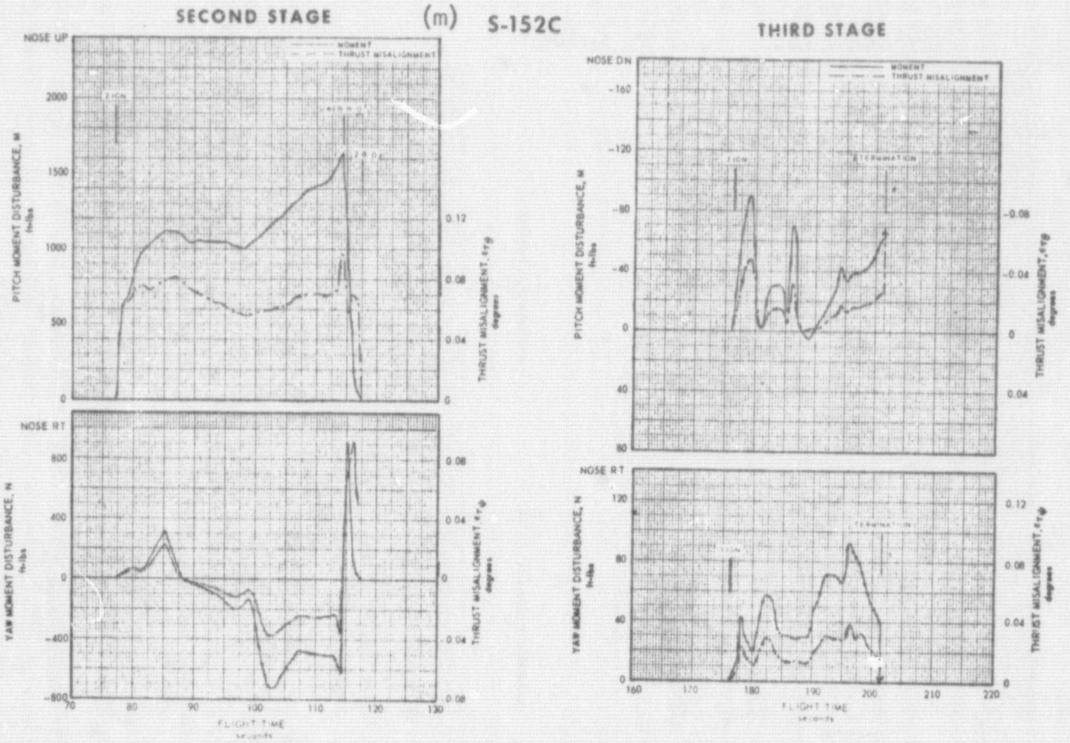


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(m) S-152C



(n) S-153C

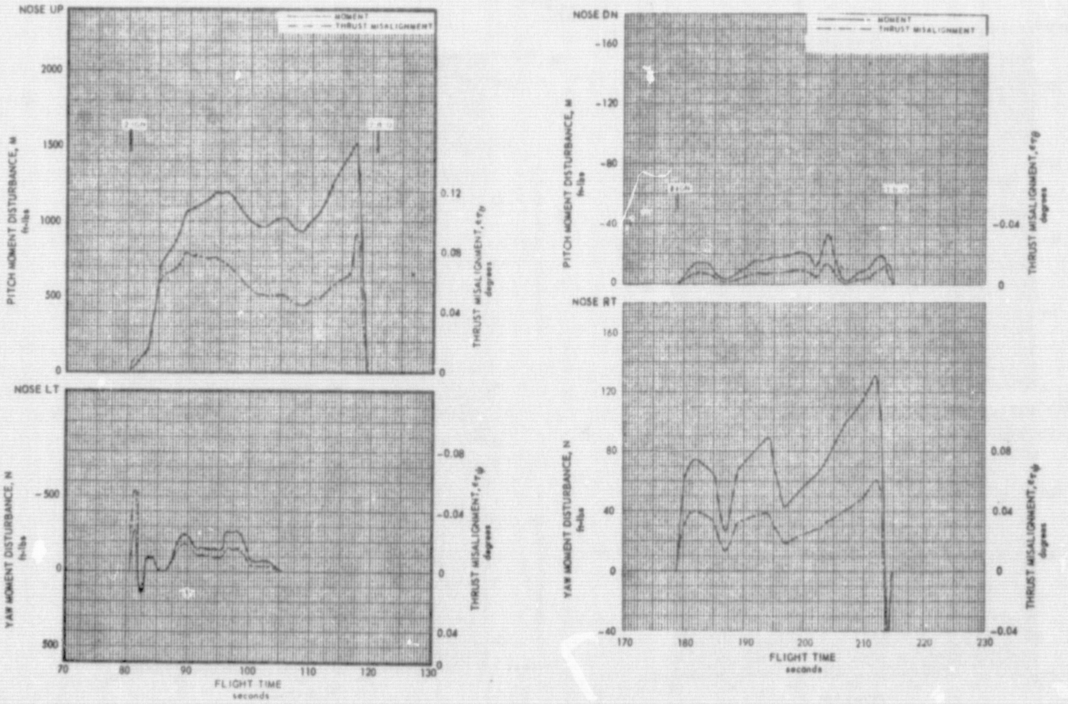
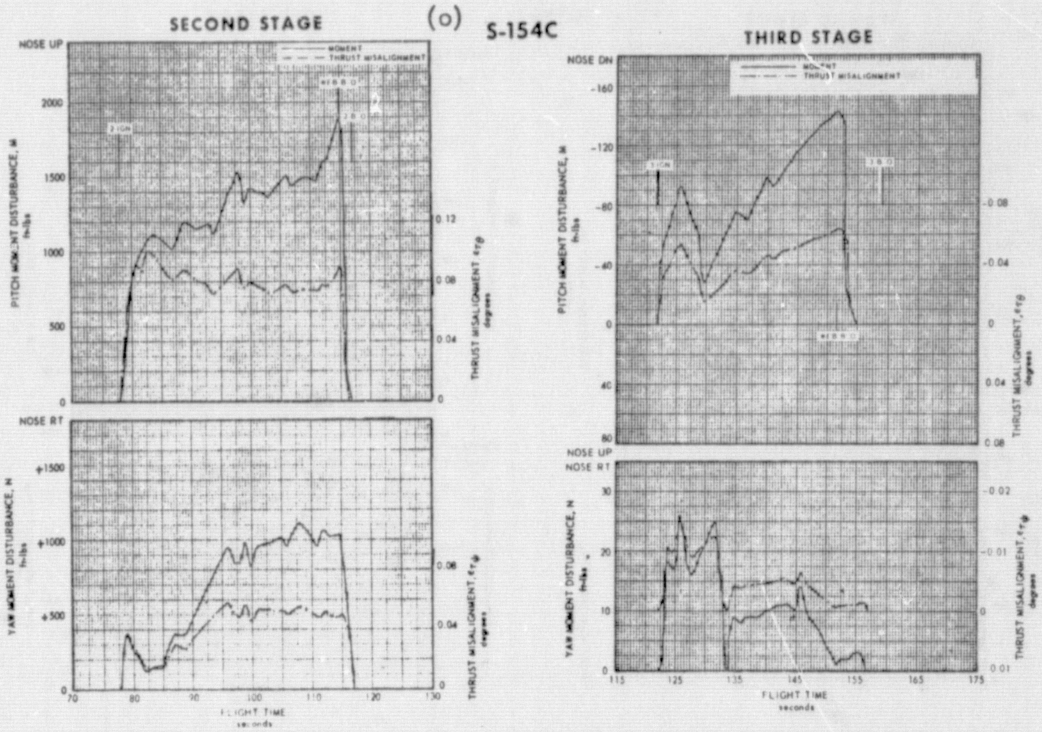


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(o) S-154C



(p) S-155C

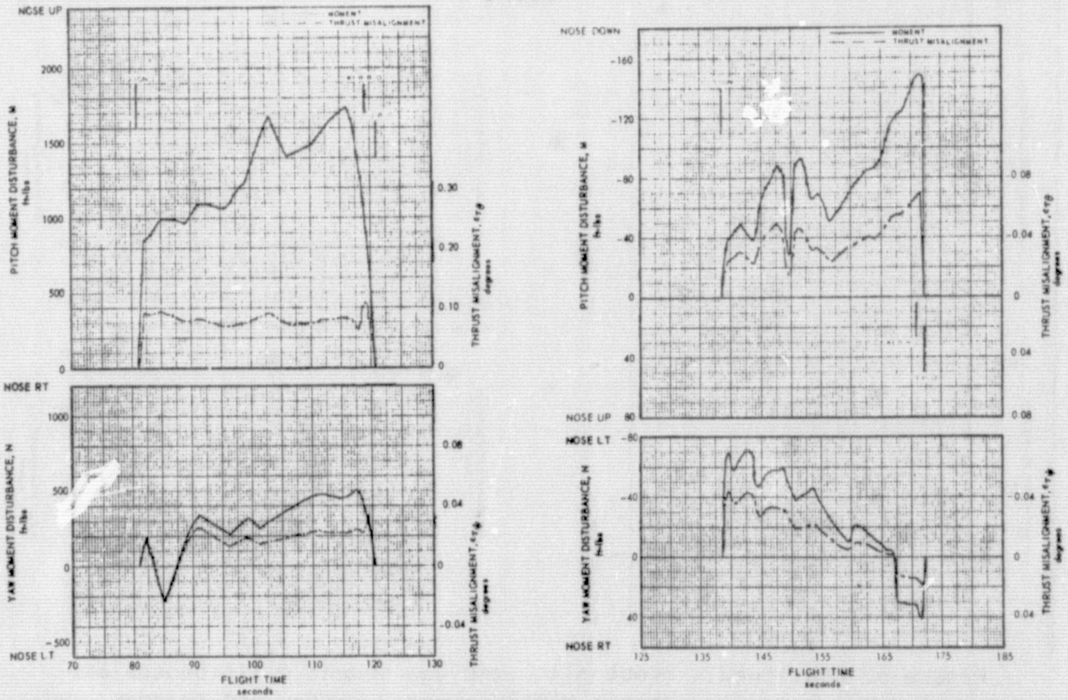
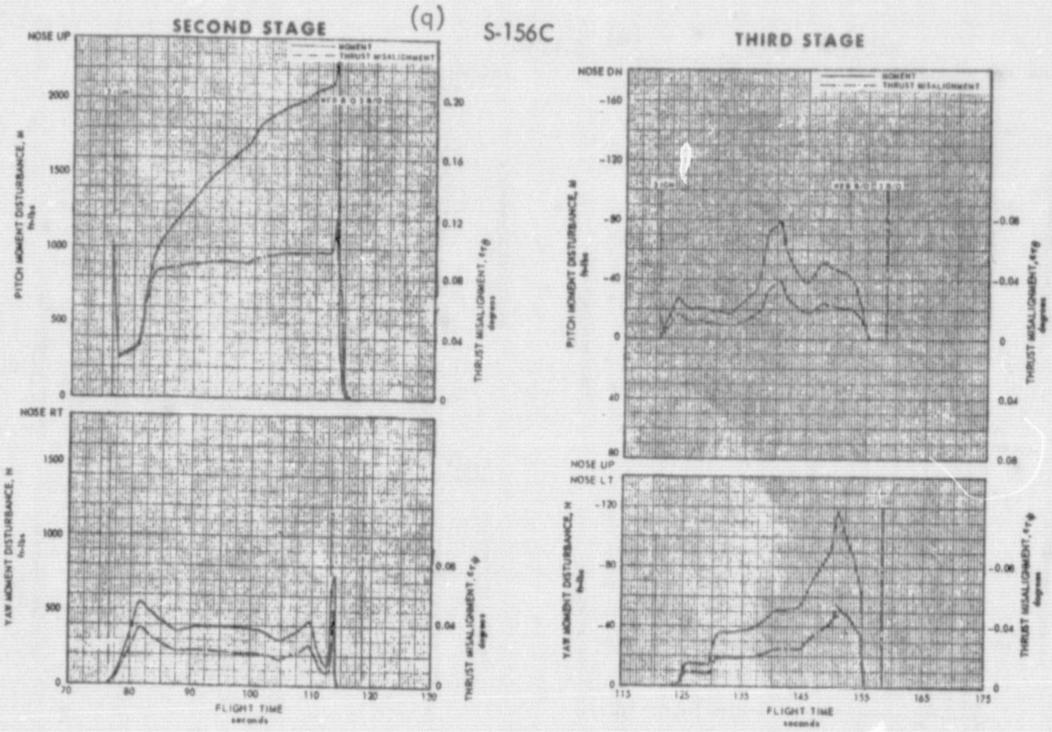


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.


(q) S-156C

Rev. A

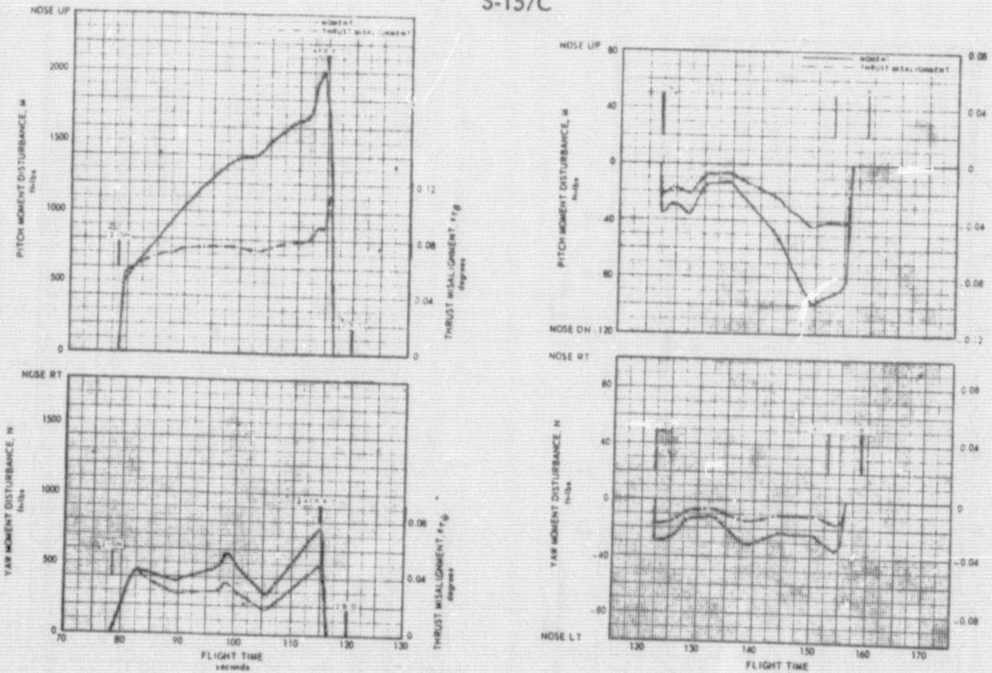
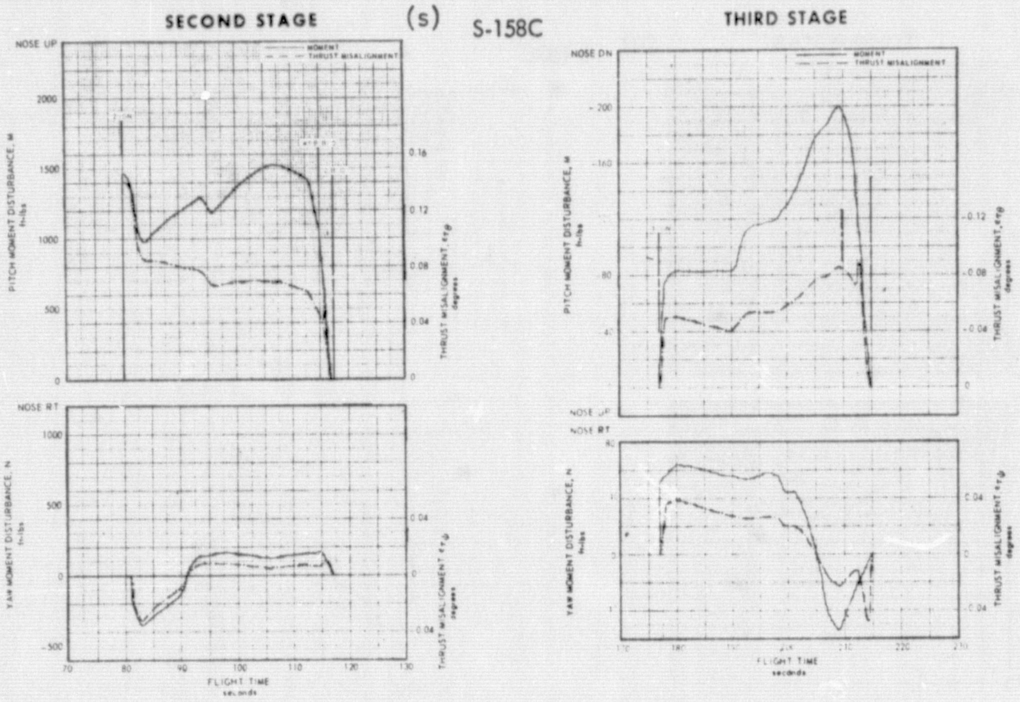

(r) S-157C

Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(s) S-158C



(t) S-159C

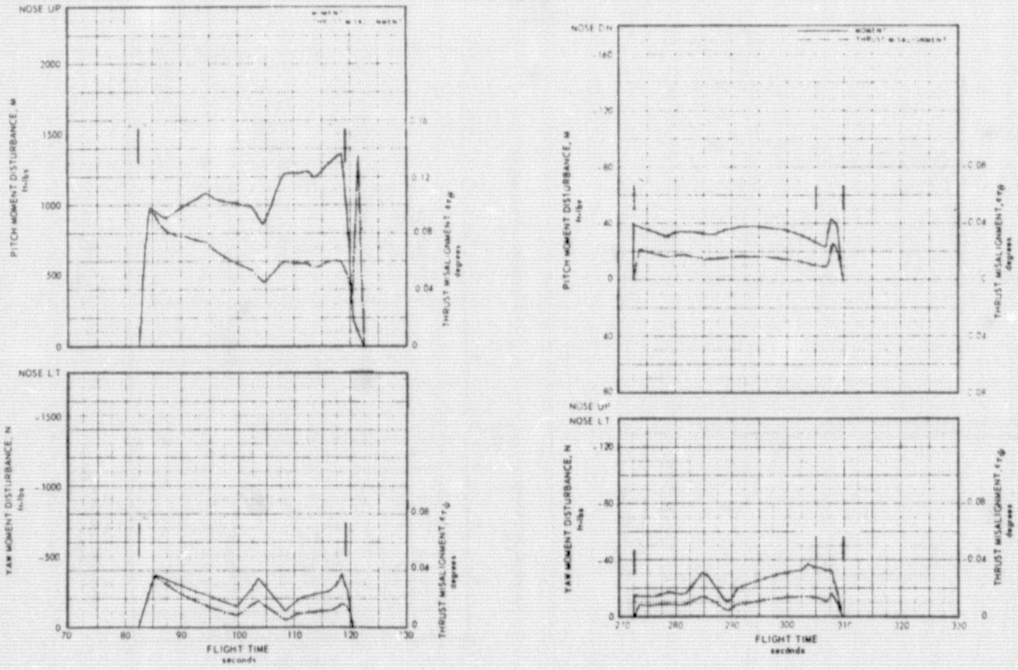
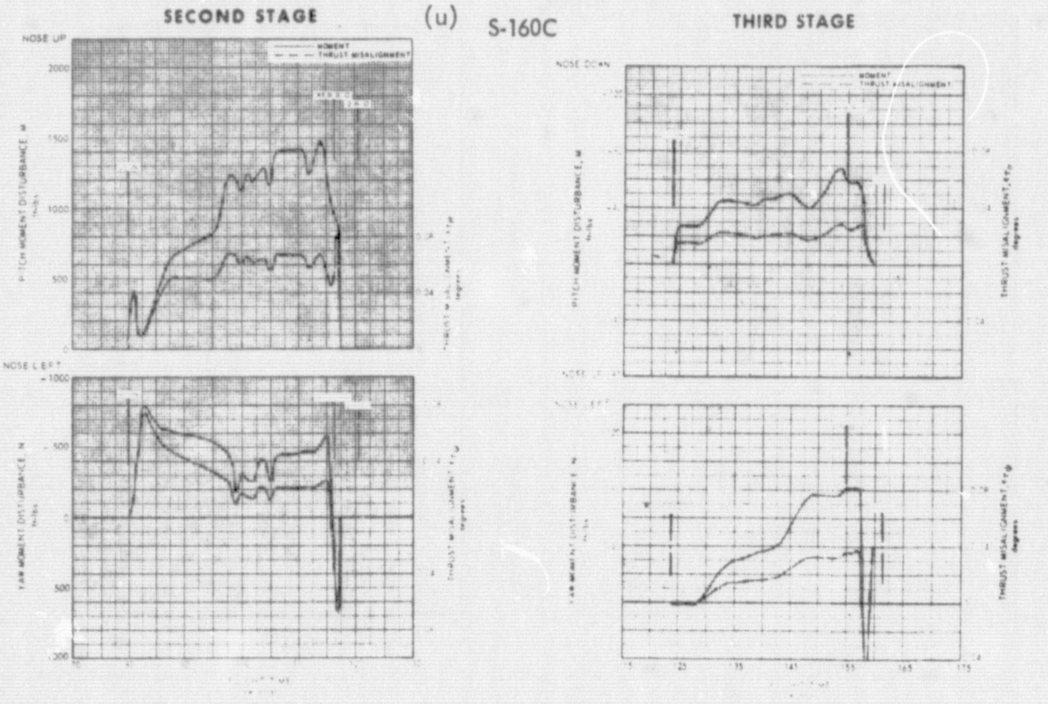


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(u) S-160C



(v) S-161C

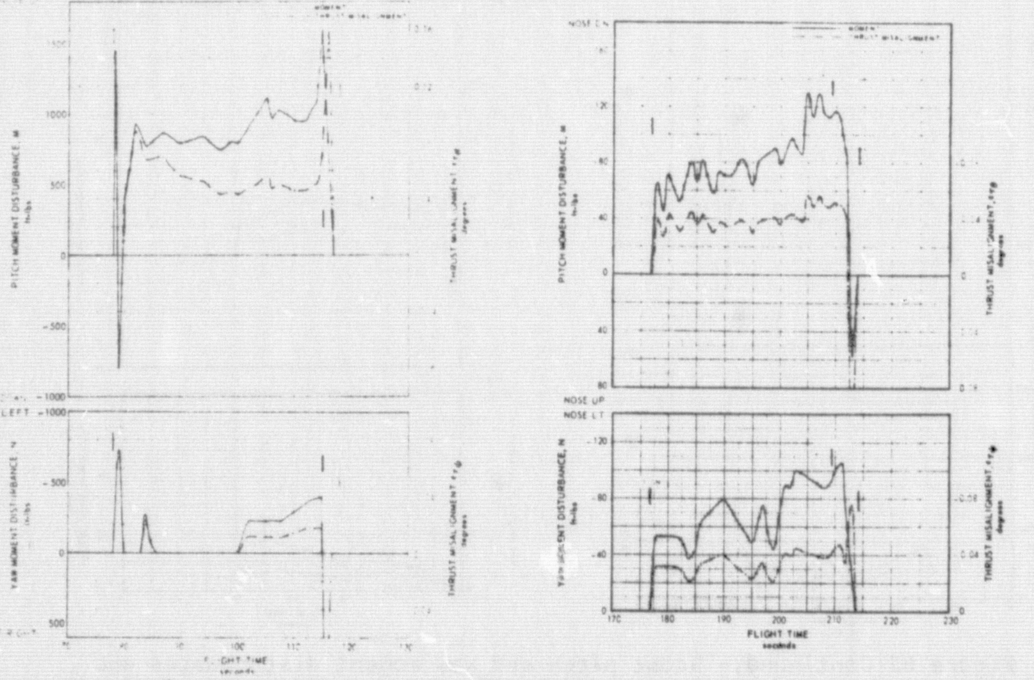
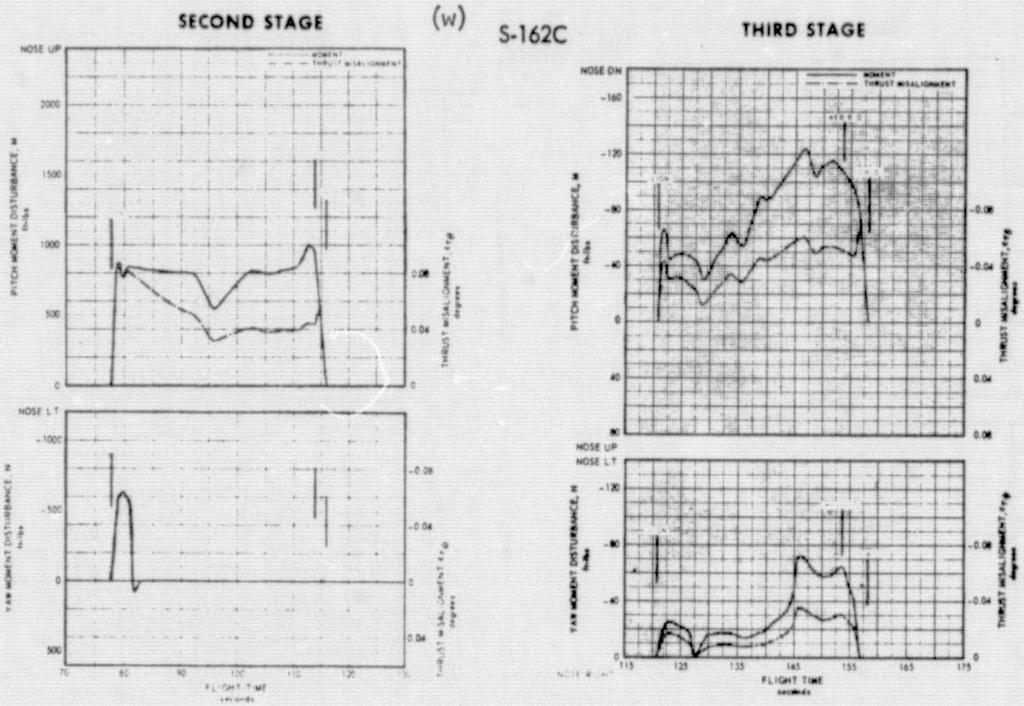


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(w) S-162C



(x) S-163CR

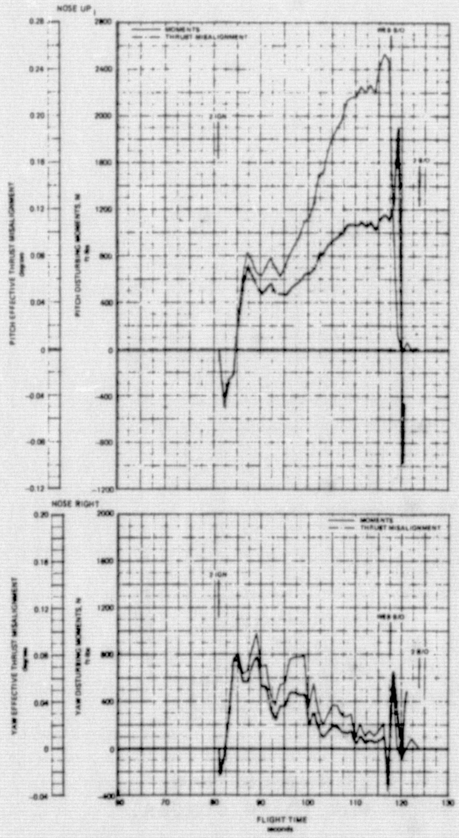
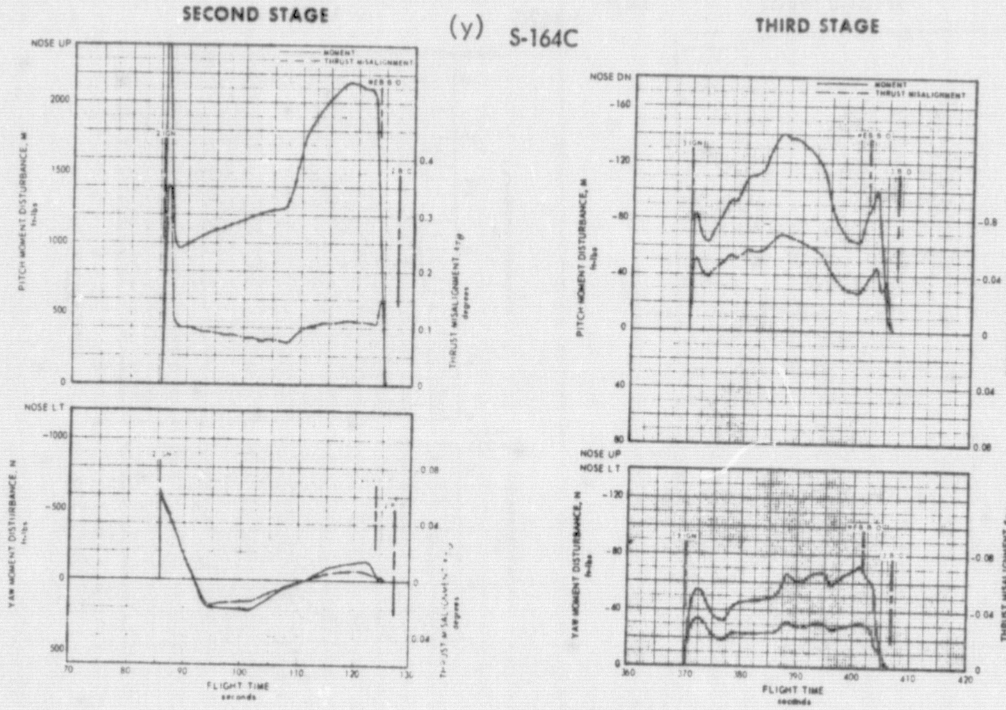


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(y) S-164C



(z) S-165C

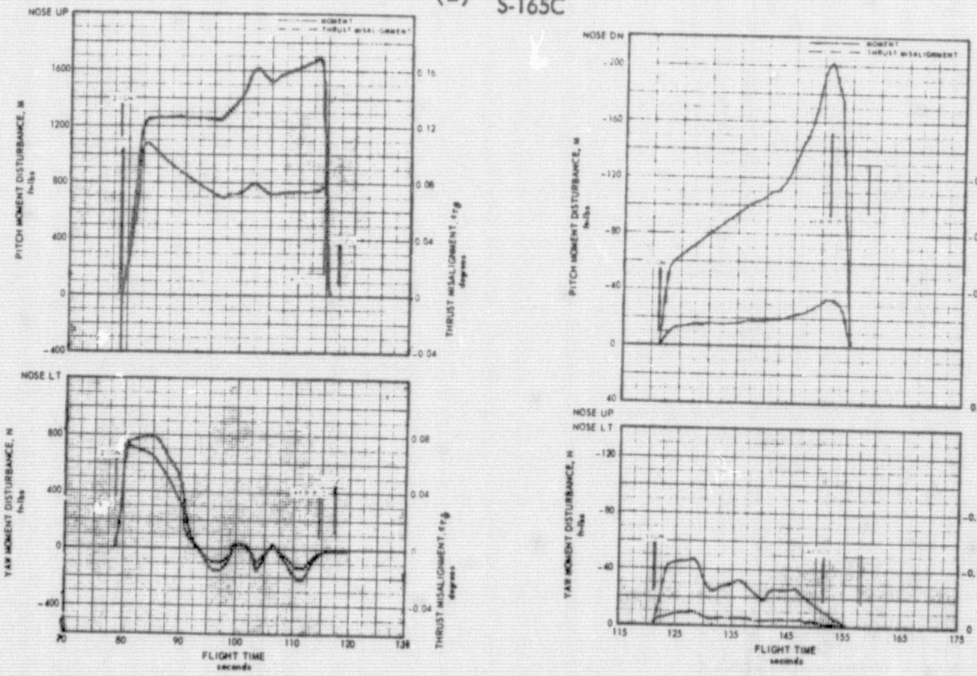
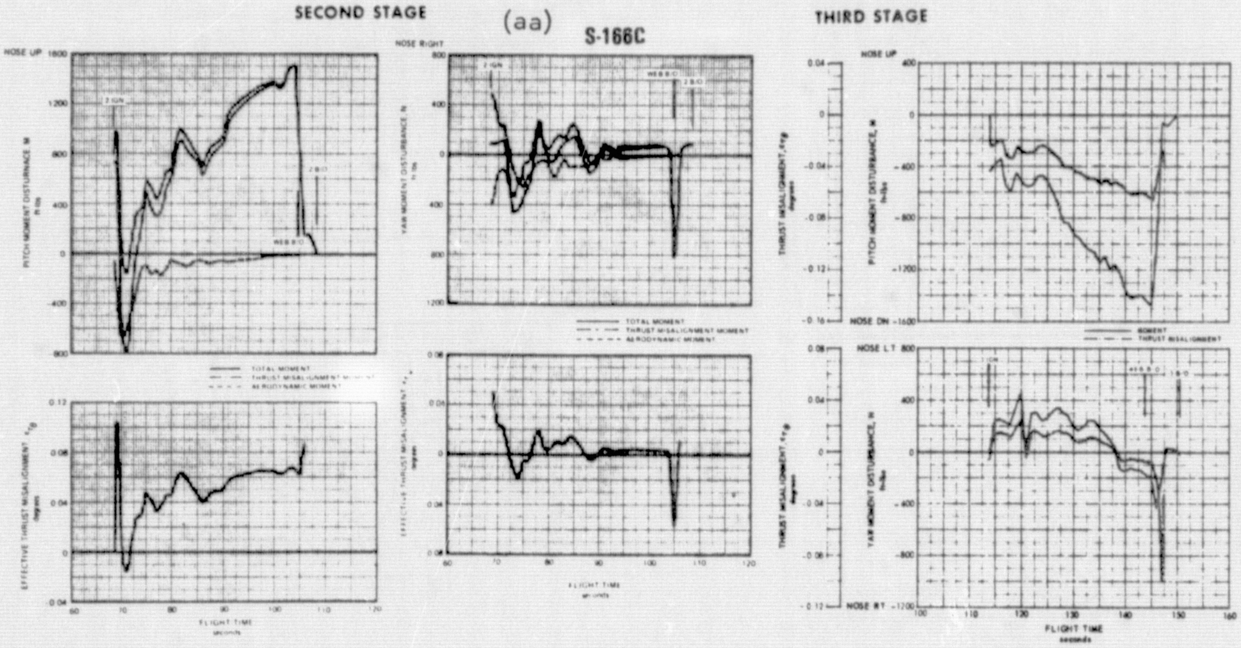


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(aa) S-166C



(ab) S-167C

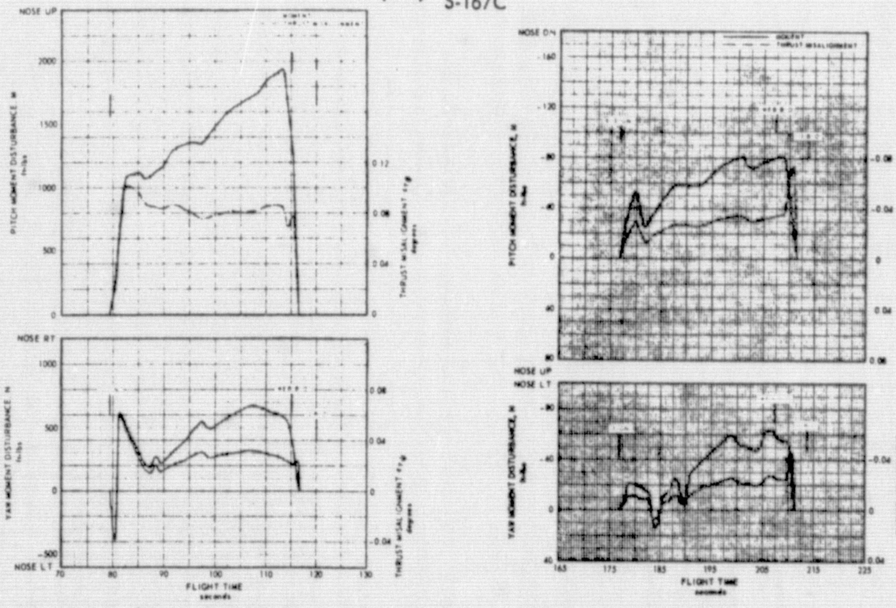
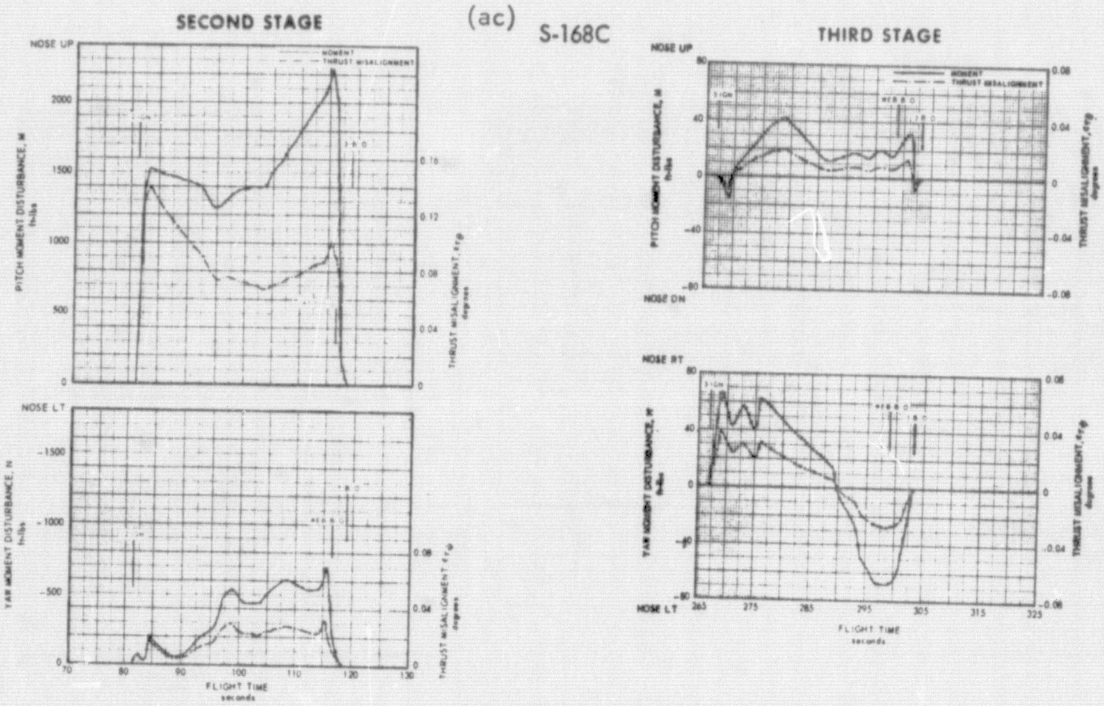


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(ac) S-168C



(ad) S-169C

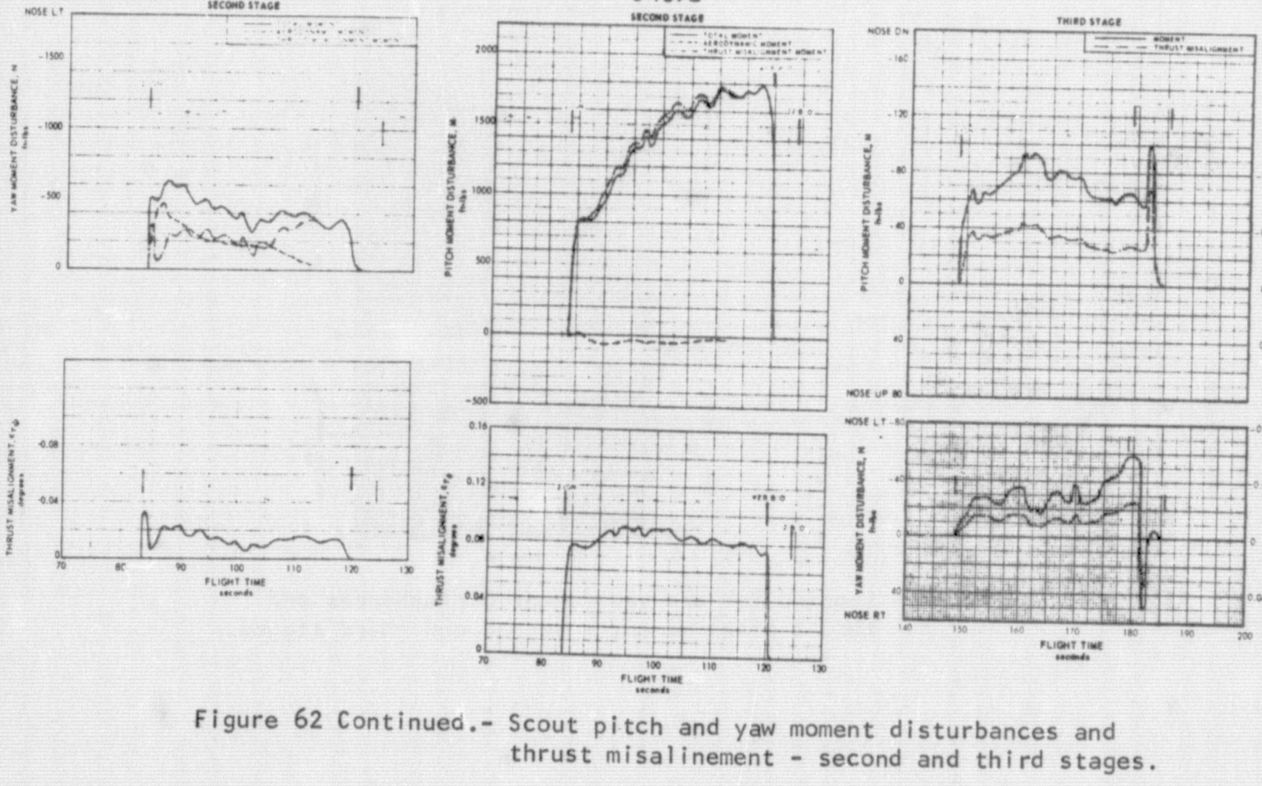
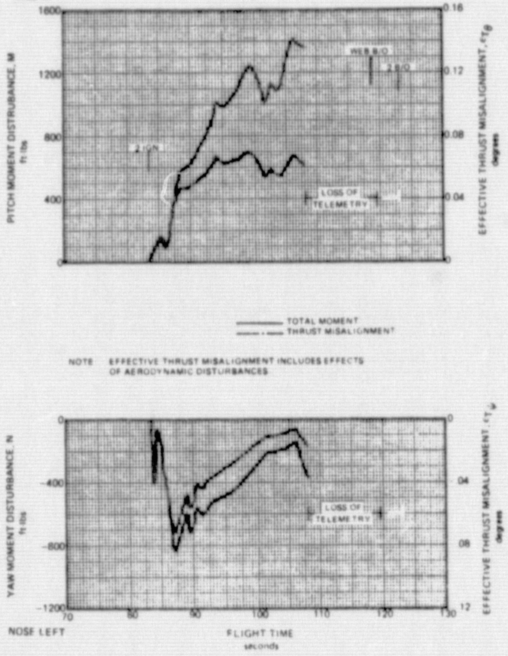


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(ae) S-170CR

SECOND STAGE

THIRD STAGE



(af) S-171C

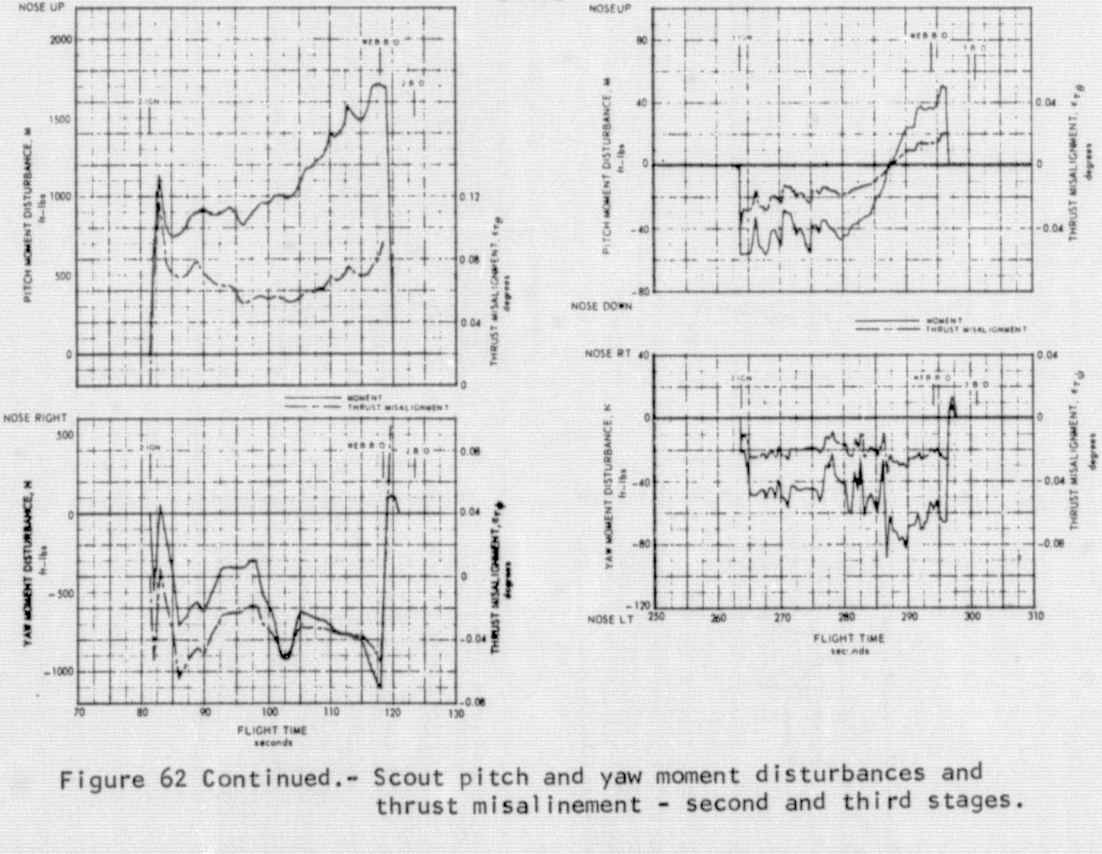
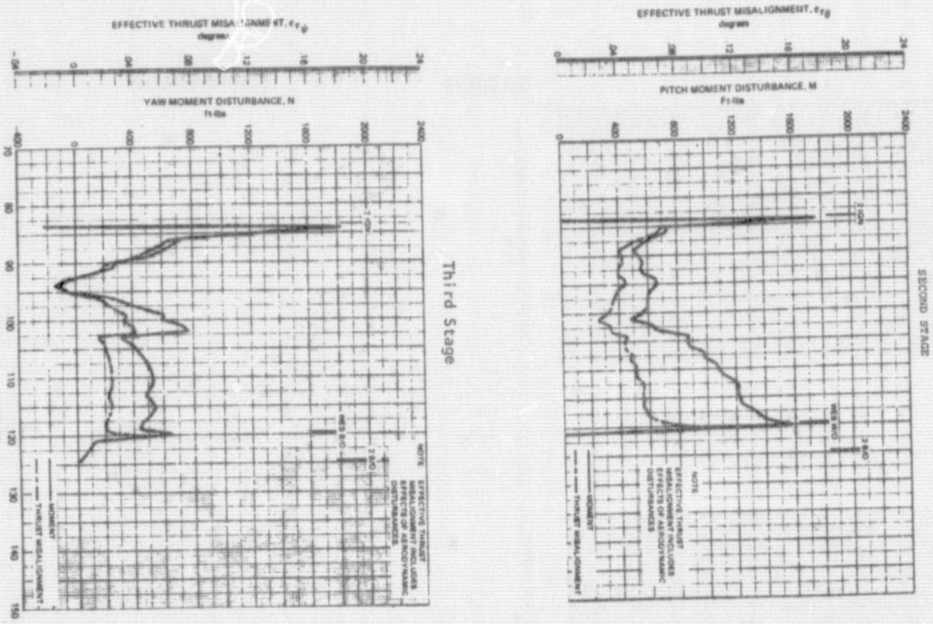
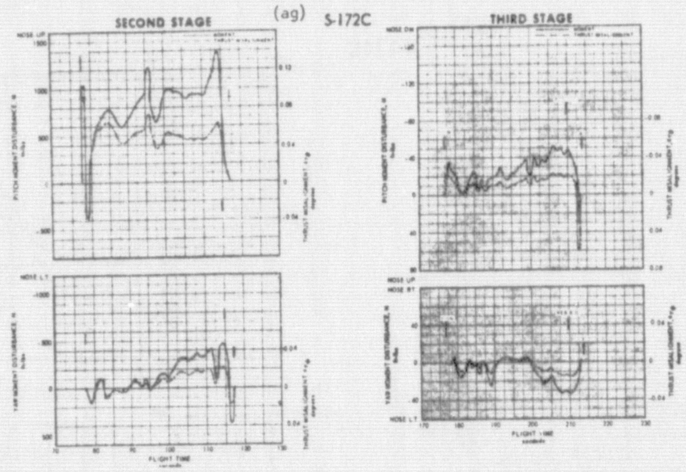


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.



(ag) S-172C



(ah) S-173C

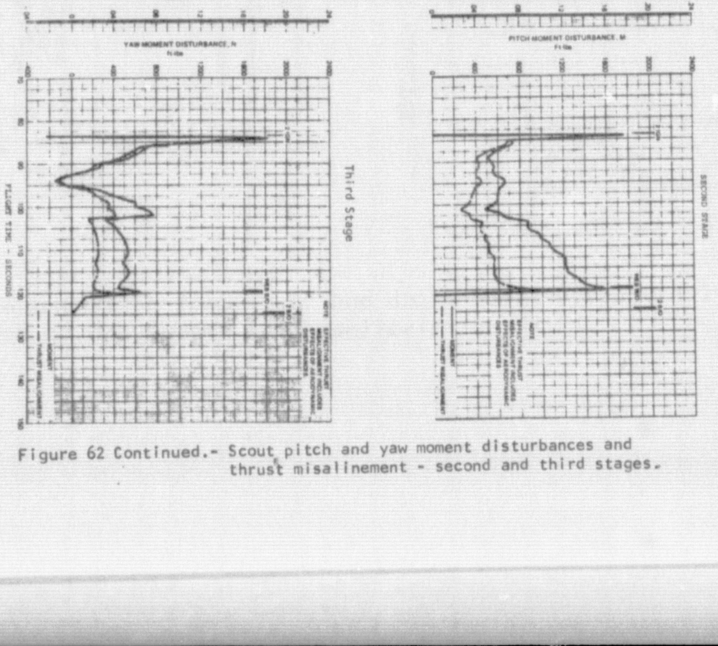
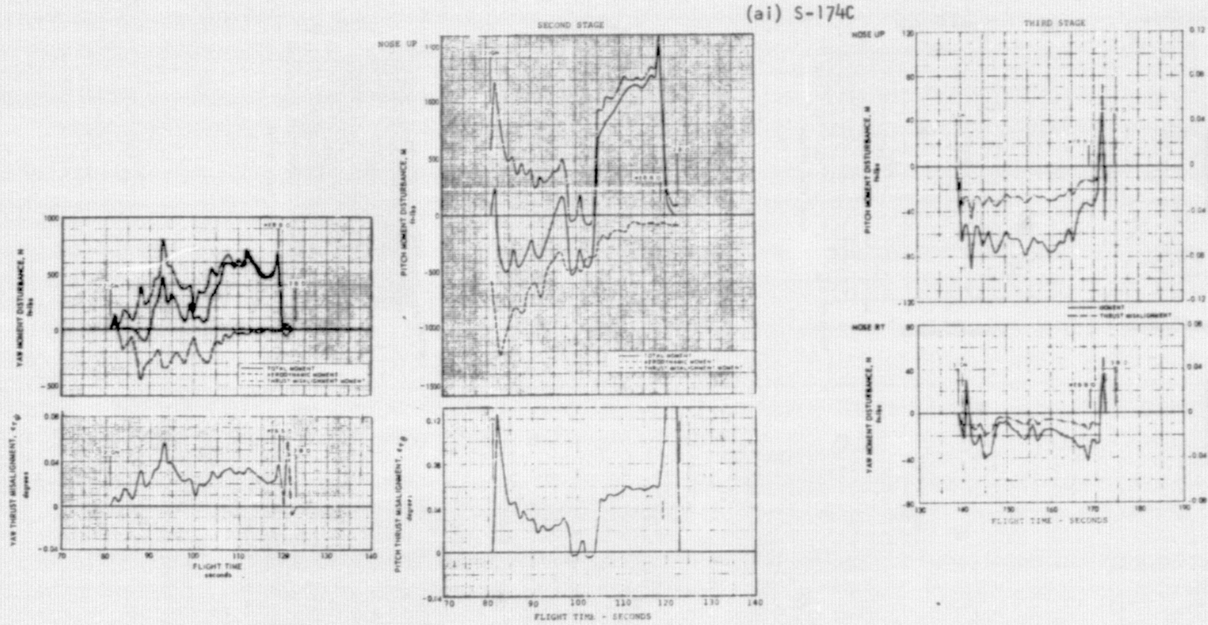


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(ai) S-174C



(aj) S-175C

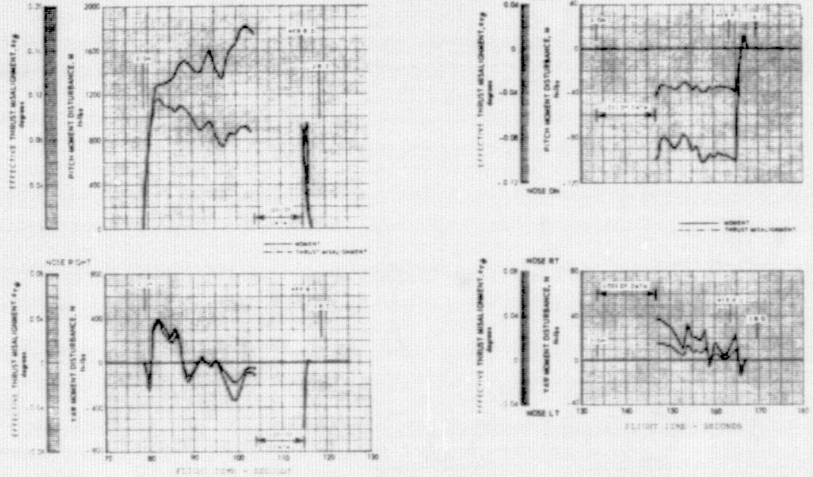
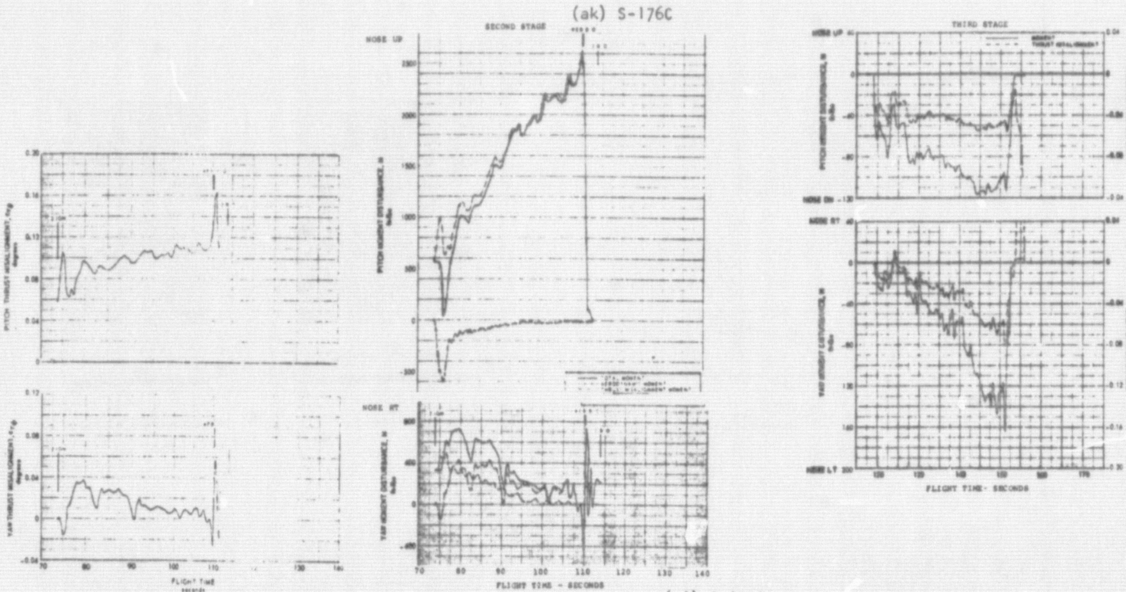


Figure 62 Continued.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

(ak) S-176C



(al) S-177C

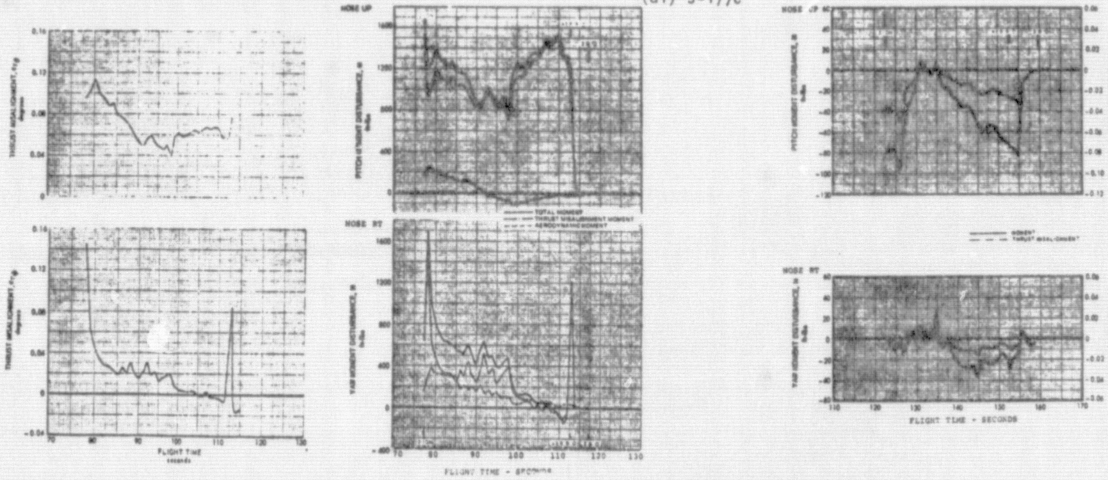


Figure 62 Concluded.- Scout pitch and yaw moment disturbances and thrust misalinement - second and third stages.

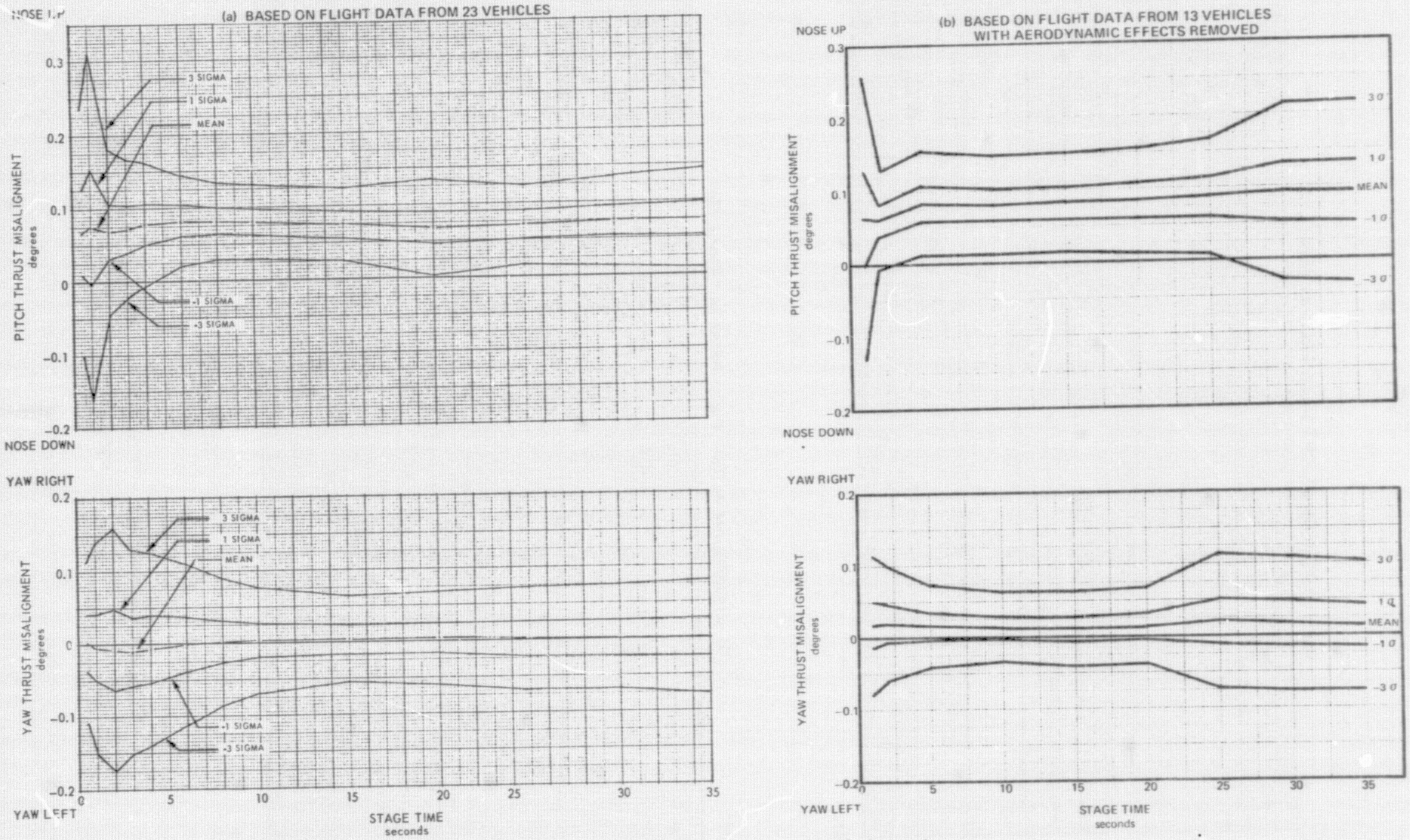
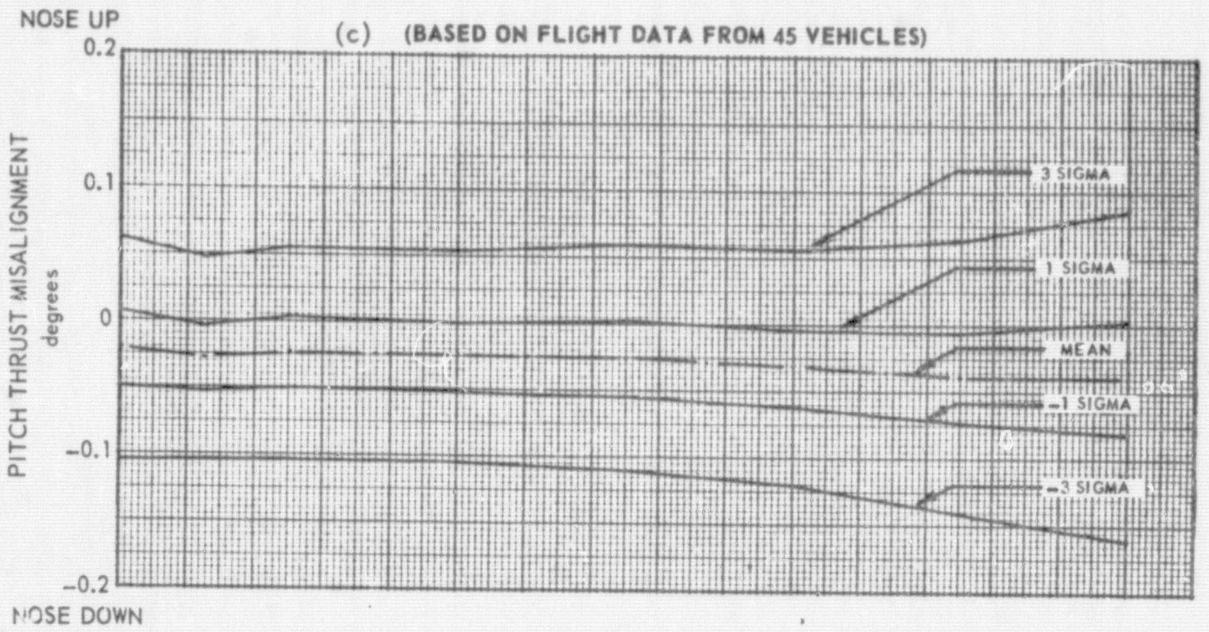
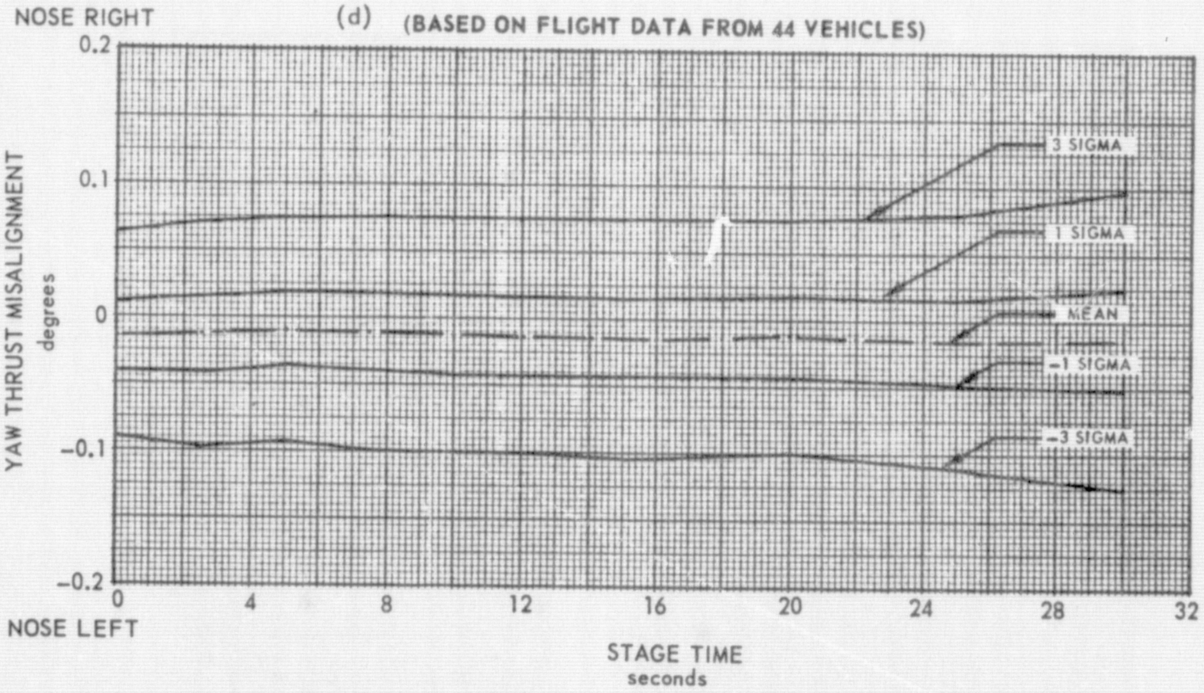


Figure 63.- Time histories of pitch and yaw components of thrust misalinement.



(c) (BASED ON FLIGHT DATA FROM 45 VEHICLES)



(d) (BASED ON FLIGHT DATA FROM 44 VEHICLES)

Figure 63 Concluded.- Time histories of pitch and yaw components of thrust misalinement.

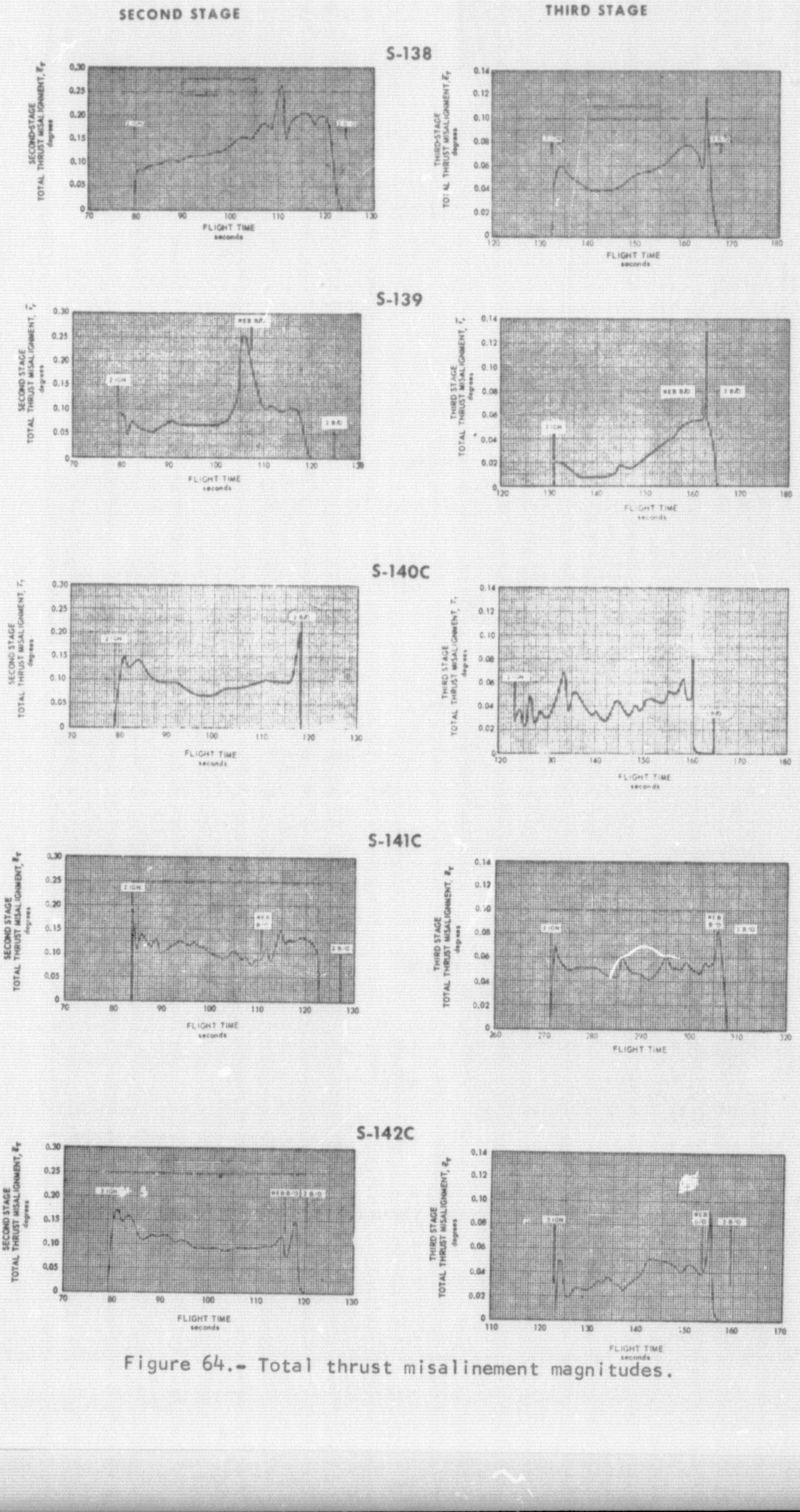
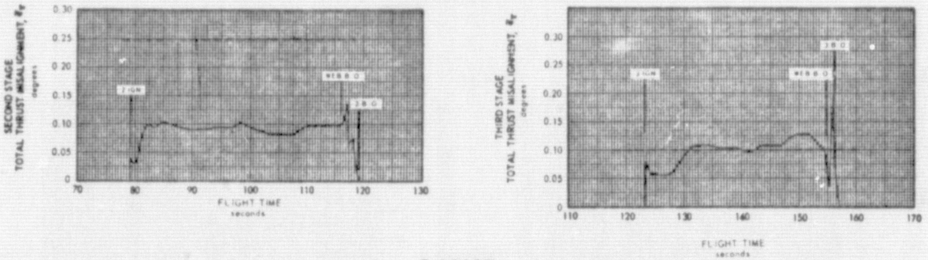
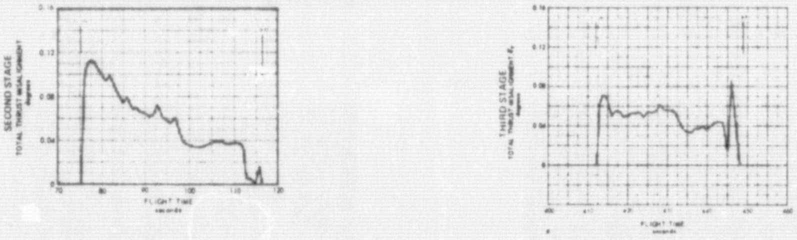


Figure 64.- Total thrust misalinement magnitudes.

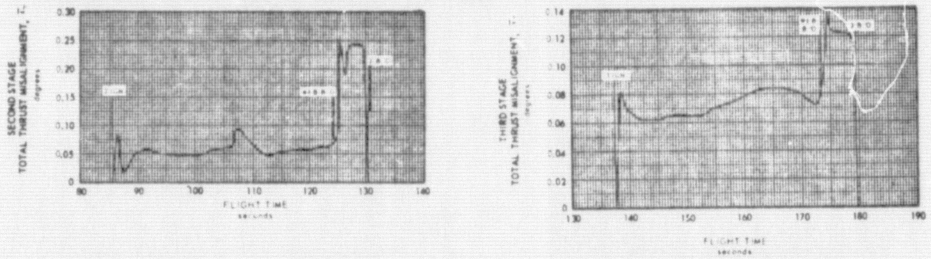
SECOND STAGE **S-143C** **THIRD STAGE**



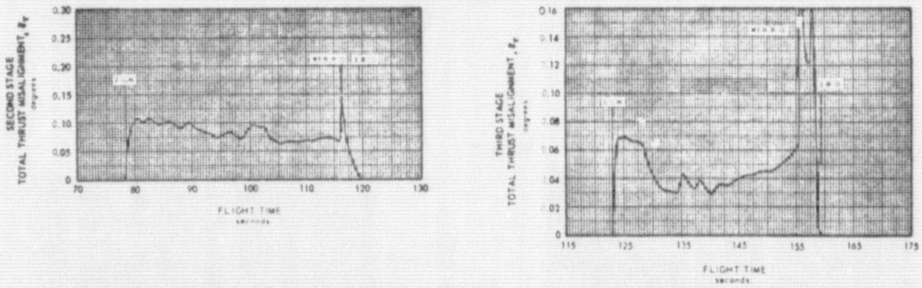
S-144CR



S-145C



S-146C



S-147C

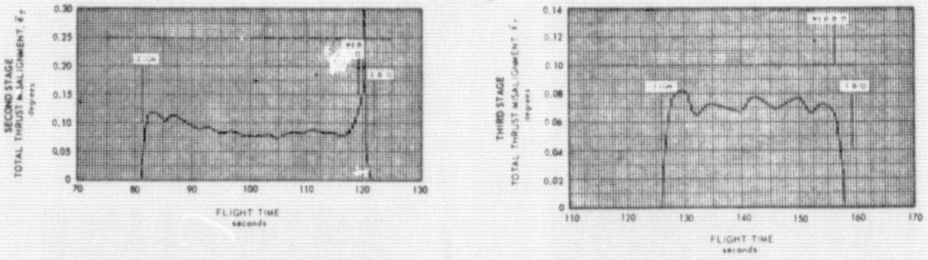


Figure 64 Continued.- Total thrust misalinement magnitudes.

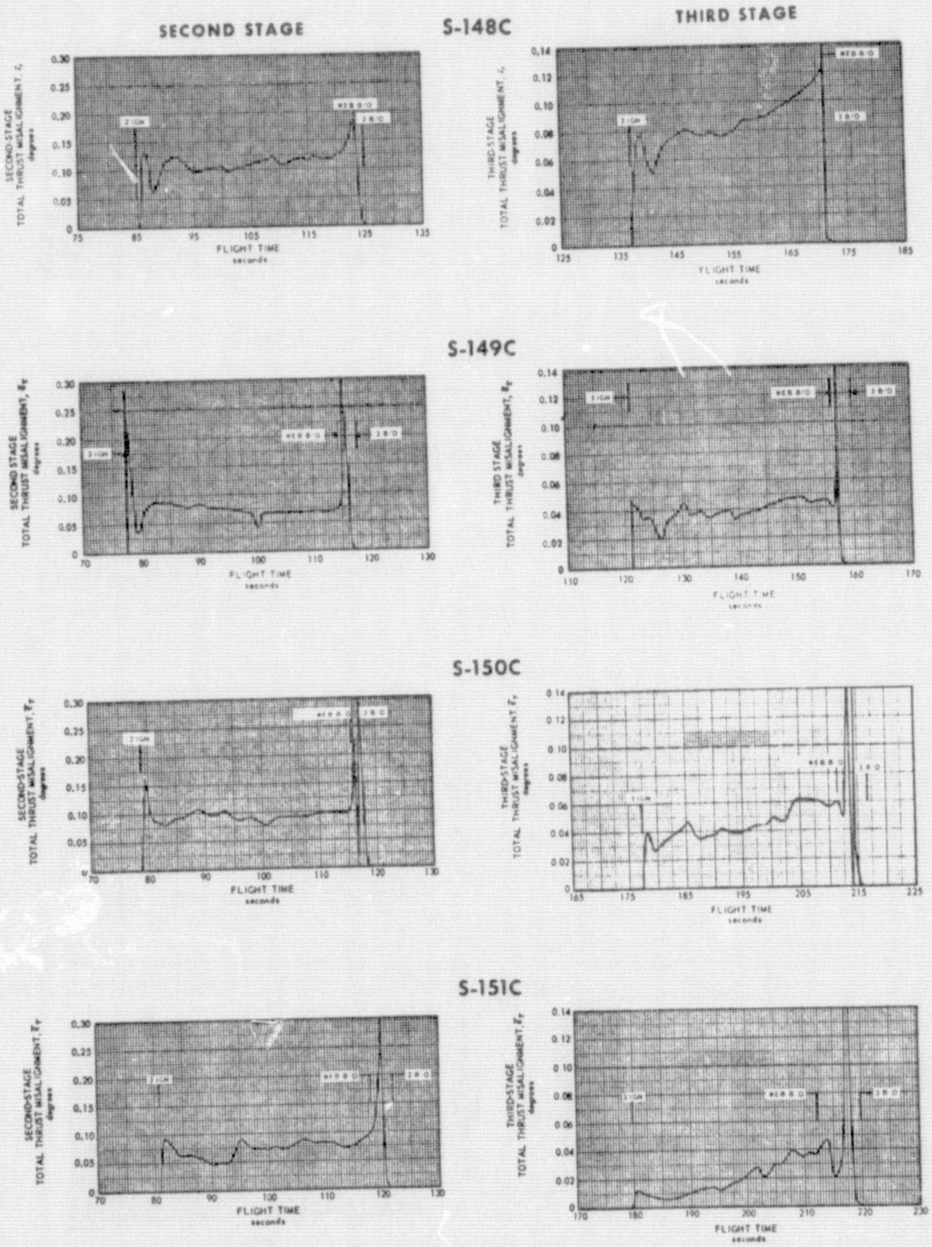
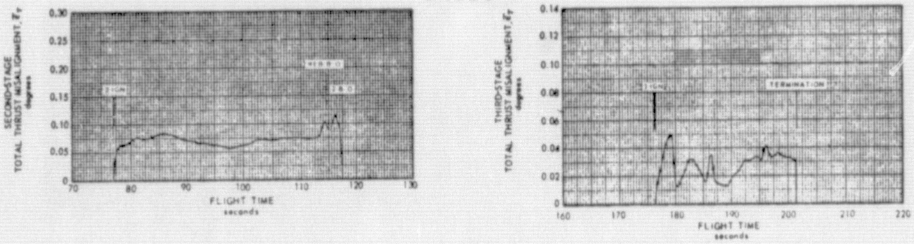


Figure 64 Continued.- Total thrust misalinement magnitudes.

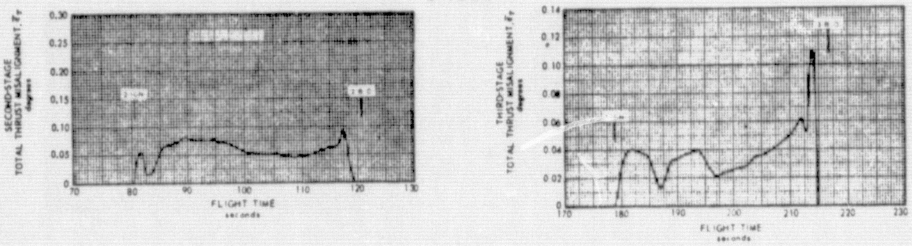
SECOND STAGE

THIRD STAGE

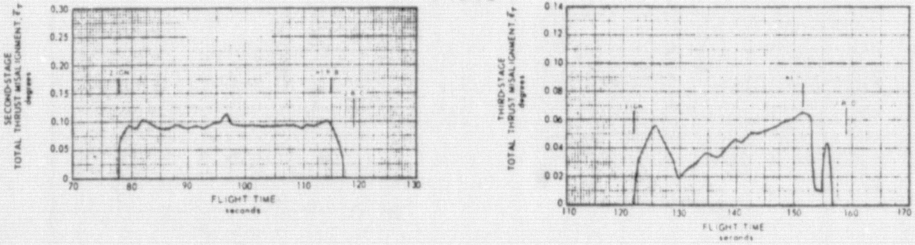
S-152C



S-153C



S-154C



S-155C

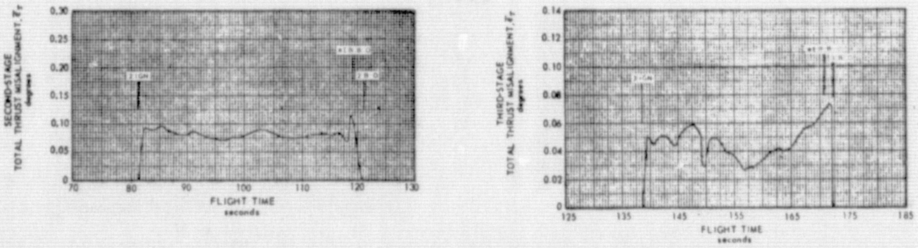


Figure 64 Continued.- Total thrust misalinement magnitudes.

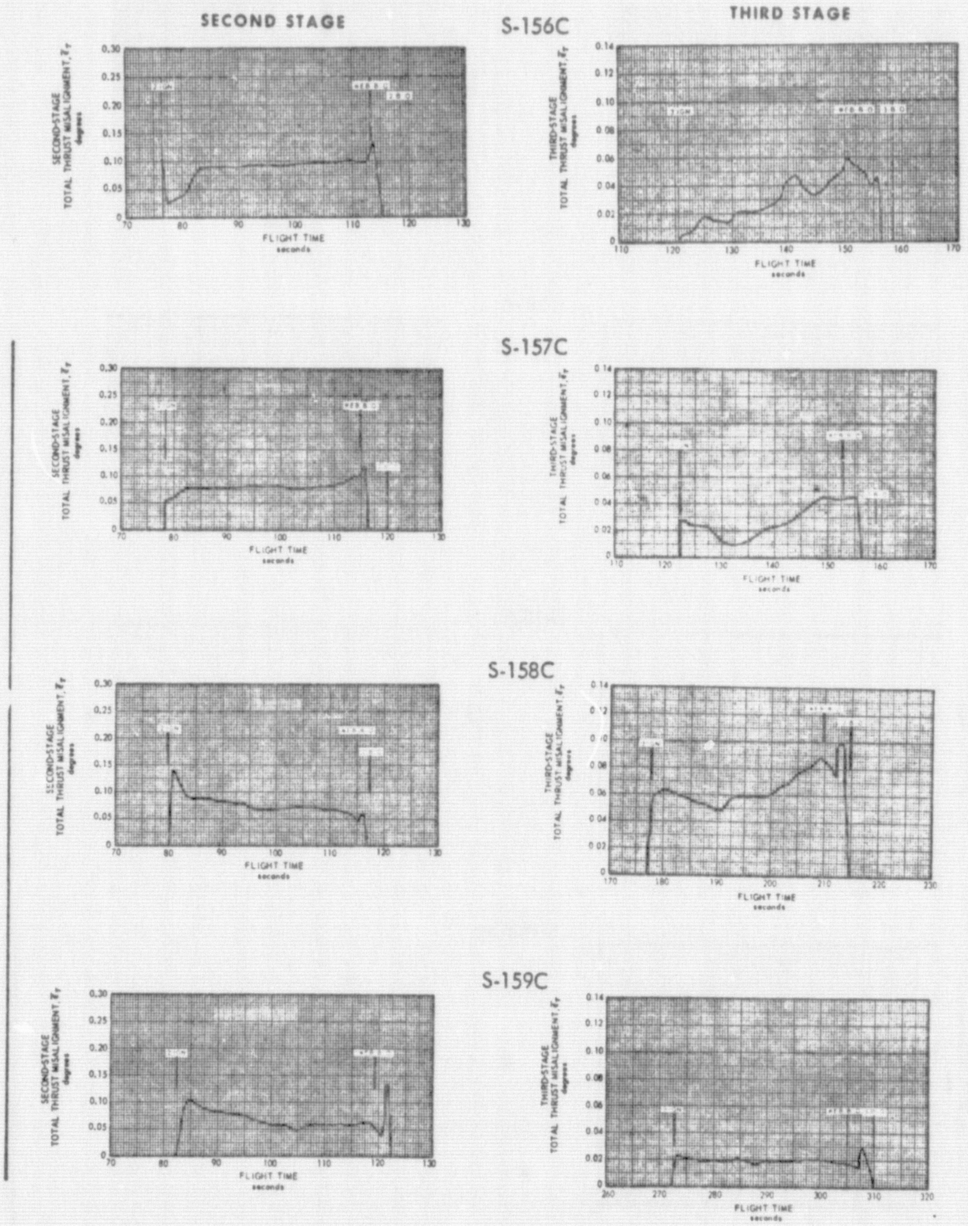


Figure 64 Continued.- Total thrust misalinement magnitudes.

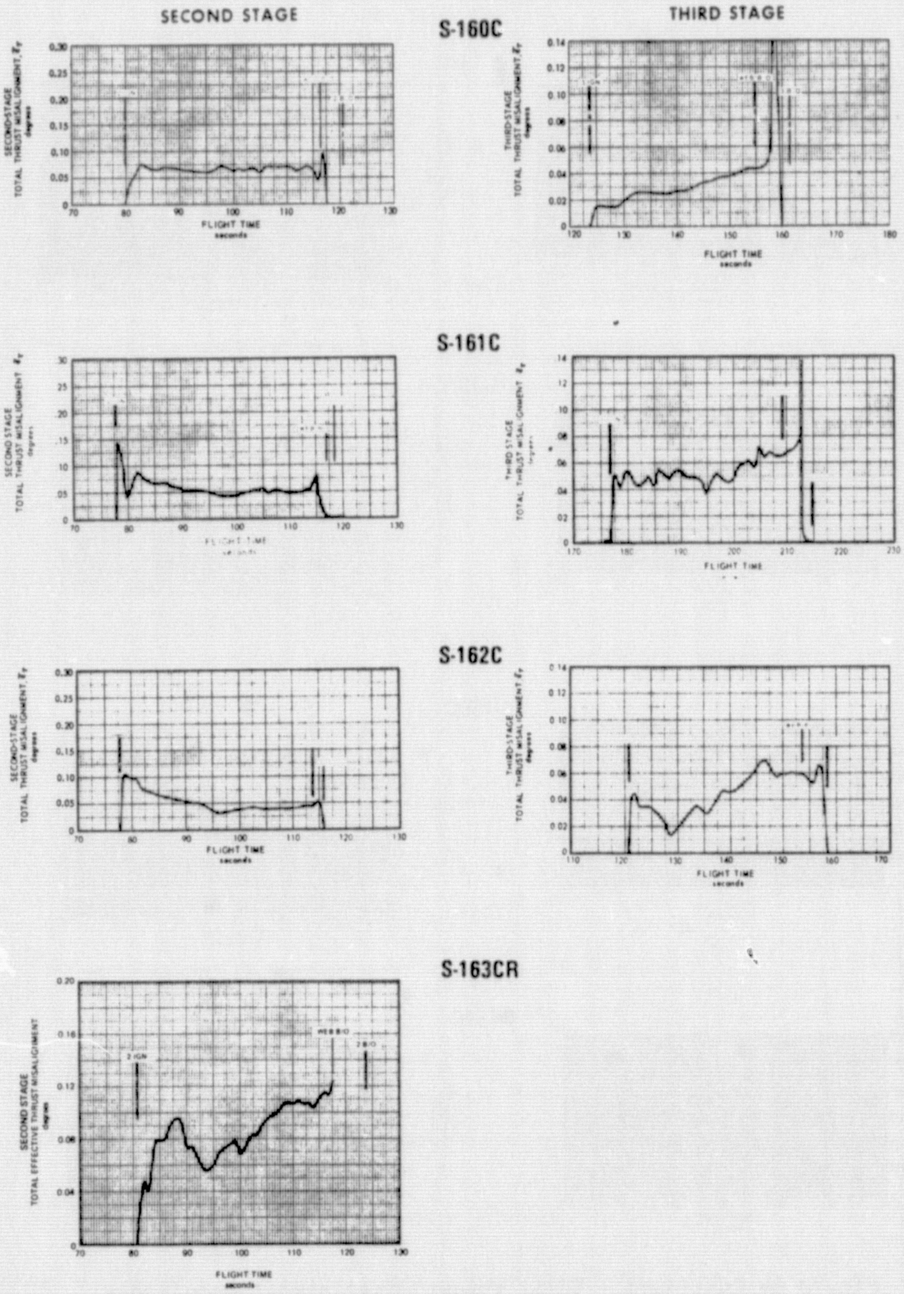


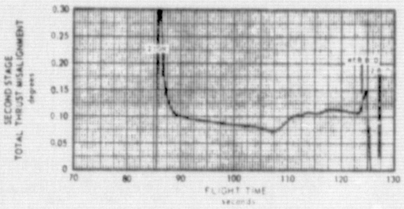
Figure 64 Continued.- Total thrust misalinement magnitudes.

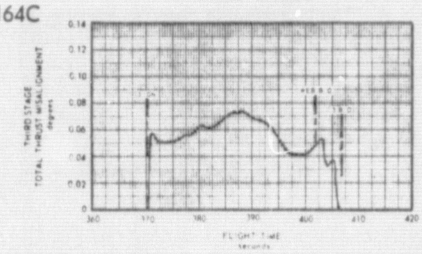
Rev. B

SECOND STAGE

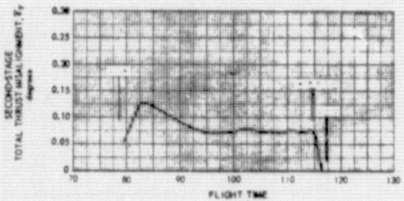
THIRD STAGE

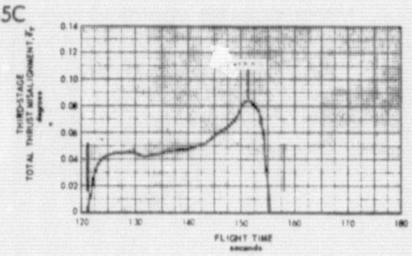
S-164C



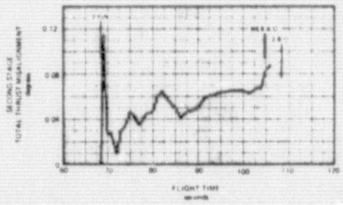


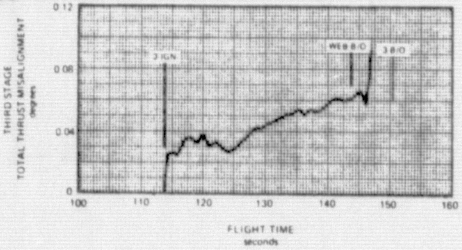
S-165C



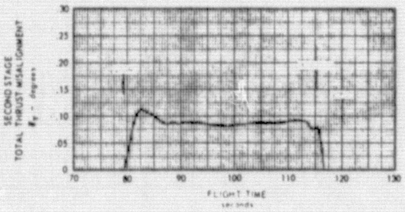


S-166C





S-167C



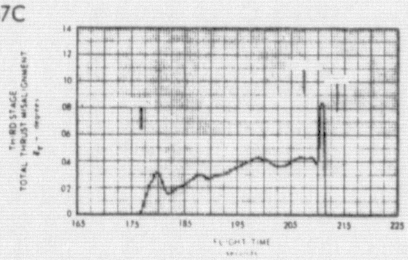


Figure 64 Continued.- Total thrust misalinement magnitudes.

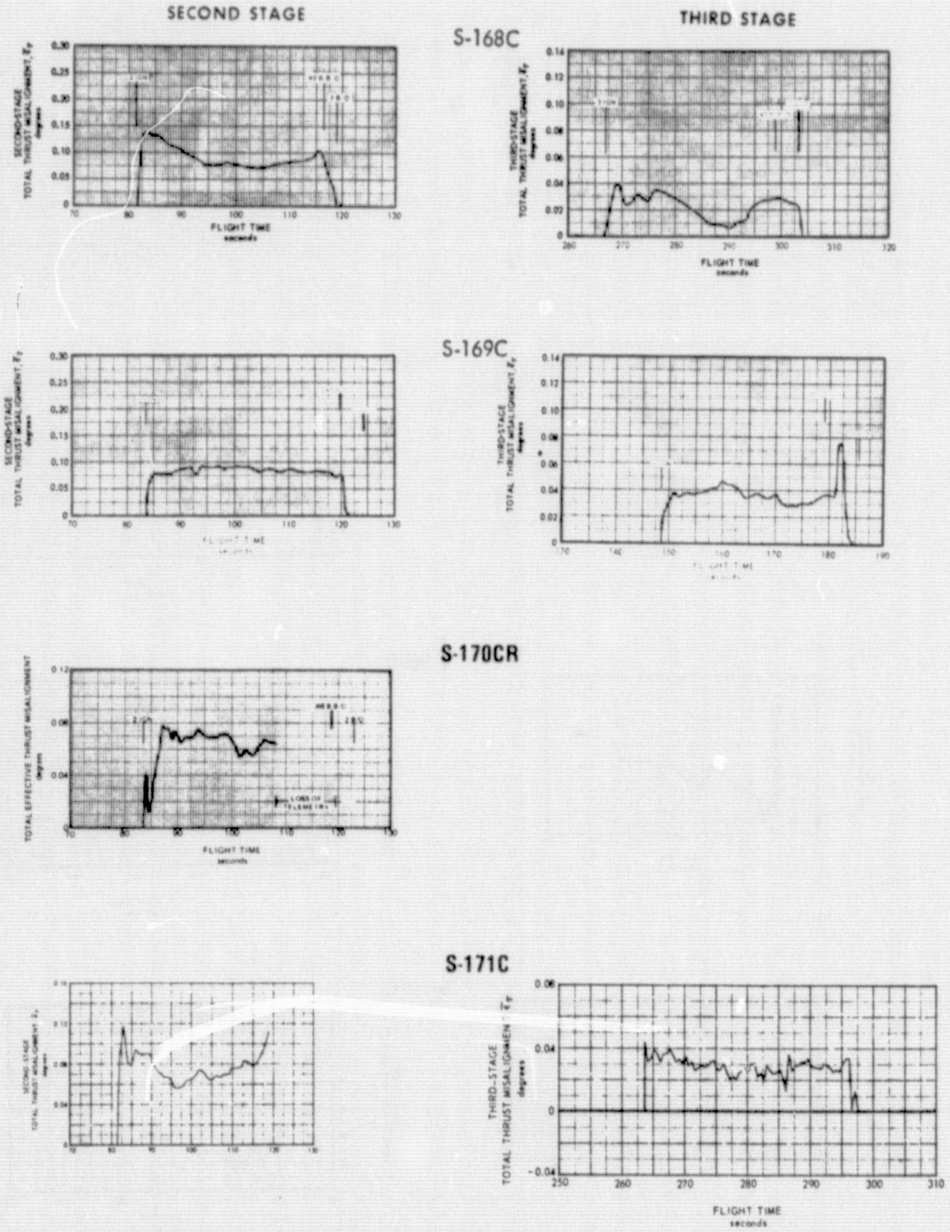


Figure 64 Continued.- Total thrust misalinement magnitudes.

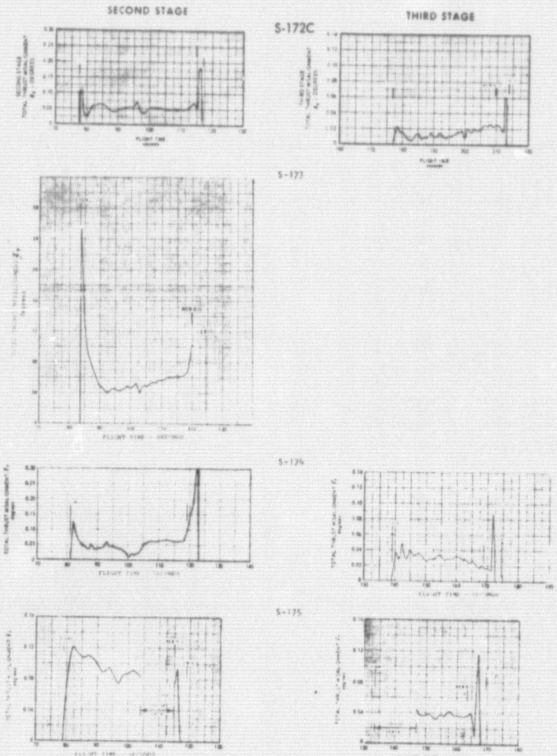
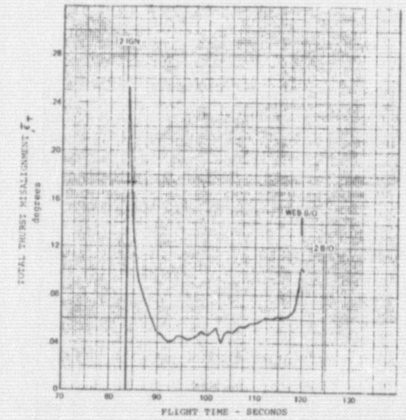
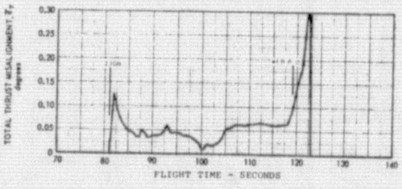


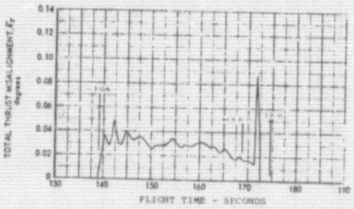
Figure 64 Continued.- Total thrust misalinement magnitudes.

S-173

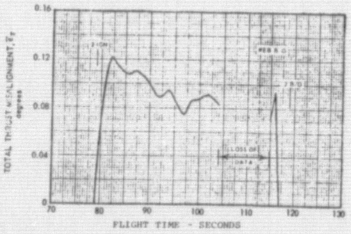


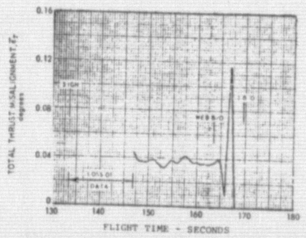
S-174





S-175





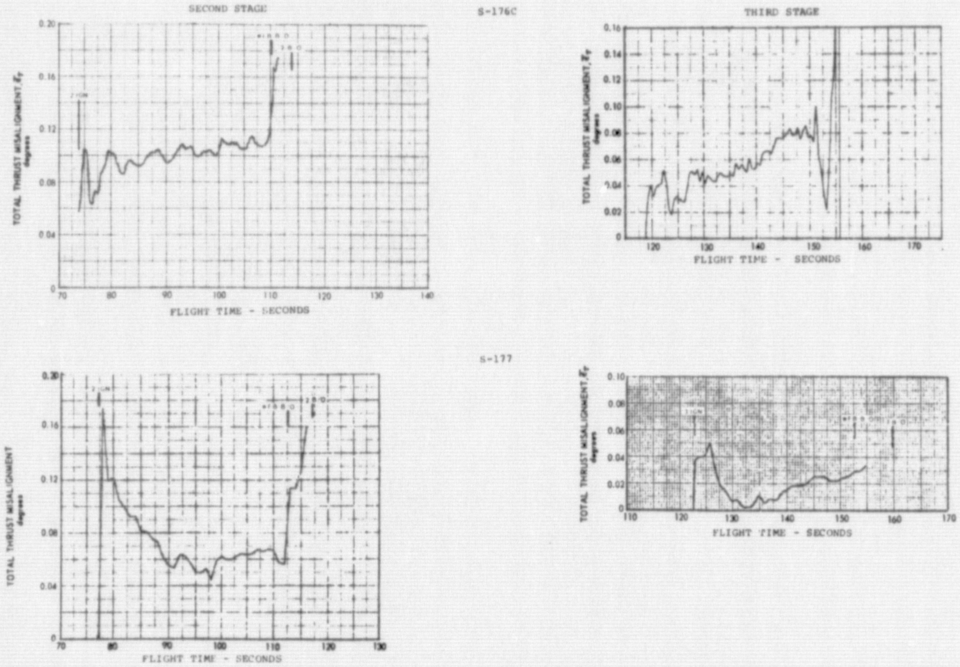


Figure 64 Concluded.- Total thrust misalinement magnitudes.

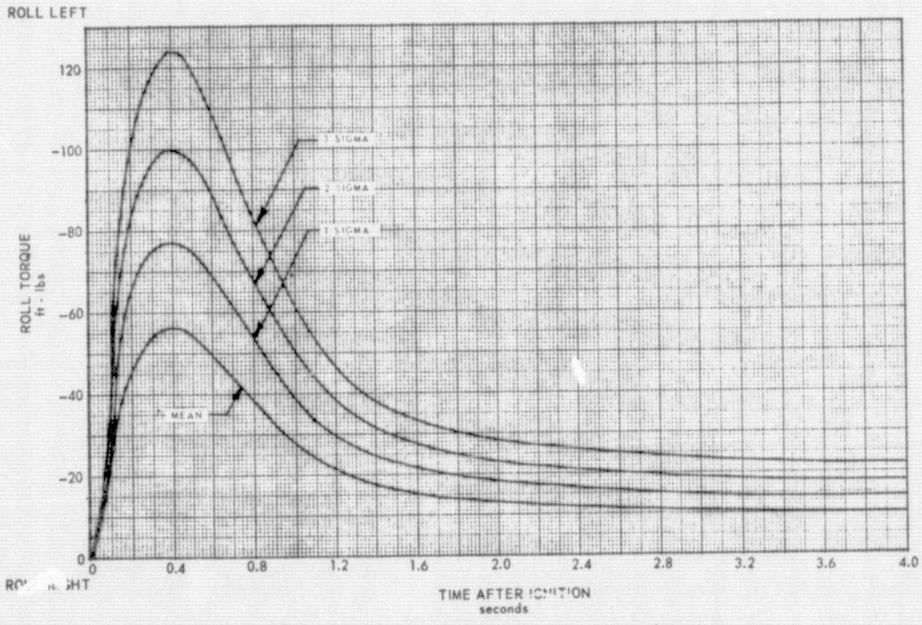


Figure 65.- Castor I transient roll torque (based on flight data from 21 vehicles).

The X-259 motor exhibits the following transient roll torque. Approximately 3 to 5 seconds after ignition roll torque builds up exponentially and shares the direction of the roll rate. The direction of the transient moment often changes sign as the roll rate changes sign due to control motor firing (within 0.1 second). The roll torque usually decays rapidly after this time period. Peak values often reach 4 to 6 foot-pounds of torque. Third-stage roll control motors produce 35 foot-pounds of torque nominal. Roll torque data are presented in figure 65 and table CC.

TABLE CC - (A) SCOUT SECOND-STAGE ROLL TORQUE TRANSIENTS

VEHICLE	MAXIMUM ROLL TORQUE (+ is roll right) ft-lbs	STAGE TIME sec
S-122	-74	0.25
S-123	-34	0.6
S-124	-58	0.6
S-125	-66	0.6
S-127	-40	0.4
S-129	-54	0.3
S-130	-58	0.7
S-131	*	*
S-133	-88	0.55
S-134	-44	0.4
S-135	-17	1.8
S-136	-90	0.5
S-137	+54	1.5
S-138	-60.5	
S-139	-51	0.2
S-140C	*	*
S-141C	-49	0.3
S-142C - S-172C	*	*

*Note: CASTOR II motor used on these vehicles; no roll torque transient experienced. Vehicle S-128 experienced failure at second-stage ignition.

TABLE CC - (A) SCOUT SECOND-STAGE ROLL TORQUE TRANSIENTS

VEHICLE	MAXIMUM ROLL TORQUE (+ is roll right) ft-lbs	STAGE TIME sec
S-122	-74	0.25
S-123	-34	0.6
S-124	-58	0.6
S-125	-66	0.6
S-127	-40	0.4
S-129	-54	0.3
S-130	-58	0.7
S-131	*	*
S-133	-88	0.55
S-134	-44	0.4
S-135	-17	1.8
S-136	-90	0.5
S-137	+54	1.5
S-138	-60.5	
S-139	-51	0.2
S-140C	*	*
S-141C	-49	0.3
S-142C - S-172C	*	*

*Note: CASTOR II motor used on these vehicles; no roll torque transient experienced. Vehicle S-128 experienced failure at second-stage ignition.

TABLE CC - (B) SCOUT THIRD-STAGE ROLL TORQUE TRANSIENTS.

VEHICLE	MAXIMUM ROLL TORQUE (+ is roll right) ft-lbs	STAGE TIME sec
S-141C	+5.7	4.7
S-142C	+6.0	4.0
S-143C	None	
S-145C	+4.5	5.0
S-146C	-5.3	3.0
S-147C	+5.0	3.8
S-148C	-4.8	4.1
S-149C	+4.3	5.5
S-150C	+3.1	4.6
S-151C	--	--
S-152C	-1.47	6.4
S-153C	-2.5	2.6
S-154C	+5.0	4.6
S-155C	-2.2	3.2
S-156C	-5.1	3.2
S-157C	+3.0	3.8
S-158C	-3.8	3.8
S-159C	-2.35	4.5
S-160C	None	
S-161C	-4.6	4.6
S-162C	-3.05	4.0
S-164C	-5.50	4.8
S-165C	-3.51	5.0
S-167C	-1.35	4.0
S-168C	-3.40	6.0
S-169C	-4.06	4.0
S-172C	+0.89	8.0
S-173C	*	-
S-174C	+4.98	4.1
S-175C	*	-
S-176C	0	-
S-177C	0	-
S-180C	-4.97	4.1
S-183C	-3.68	4.1

*Loss of T/M

NOTE: Not evaluated on vehicles prior to S-141C.

(h) Second- and Third-stage Control Fuel Consumption

The historical summaries of second- and third-stage boost and coast control system hydrogen peroxide consumption are presented in tables CC and CCI,, respectively. The peroxide consumption is calculated based on the pressure drop of the unregulated nitrogen charging system. The effects of nitrogen temperature variations on expelled hydrogen peroxide are also accounted for. The total impulse expended by the control motors is calculated using the telemetered control motor pulse data and the moment disturbance information extracted from the telemetered rate gyro data. The total impulse and calculated hydrogen peroxide consumption are used to calculate the effective specific impulse of the control system. Second-stage coast fuel consumption with the body bending notch filter network switched "in" is much higher than with it switched "out." Where long coast times are required the filter is switched "out" during coast. On the six reentry missions fuel consumption was reduced further by using wider deadbands during boost and coast.

A change in the procedure used to calculate hydrogen peroxide consumption has been initiated with vehicle S-156C. This procedure accounts for the effects of nitrogen temperature variations on expelled hydrogen peroxide. On vehicle S-156C the use of this temperature adjustment resulted in a reduction in calculated boost fuel consumption of 20 percent.

The summary of third-stage retro fuel used, retro time and specific impulse is included in table CCI. Retro is accomplished by continuous firing of all four boost pitch and yaw motors which are canted 30 degrees. These motors fire until the hydrogen peroxide in the control system is depleted. Approximately one pound of hydrogen peroxide ullage remains in the system after retro.

(i) Second- and Third-stage Initial Conditions and Capture

The pitch, yaw, and roll attitude error and angular rate prior to second-stage ignition are presented in table CCII. The rigid-body rate changes due to ignition transients and separation disturbances are also shown with the maximum attitude error and rate attained during the control system capture maneuver. Similar information for the third stage is presented in table CCIII.

(j) Vehicle Flight Loads

Table CCIV presents the bending moment at the critical station (Sta. 131) occurring during first-stage flight for vehicles S-138 through S-172C. These bending moments are due to the vehicle maneuvers and wind loading. The measured wind speed, azimuth, and altitude for which these maximum bending moments occur are also tabulated. The bending moments are also presented as a percentage of the allowable; in none of the tabulated flights was the allowable exceeded.

TABLE CC - SCOUT SECOND-STAGE FUEL CONSUMPTION REACTION CONTROL SYSTEM

VEHICLE	FUEL AT LIFT-OFF lbs	MISSION	CASTOR MOTOR	BOOST FUEL lbs	BOOST FUEL I_{sp} sec	COAST TIME sec	FILTER NETWORK	COAST FUEL lbs	COAST FUEL FLOW RATE lbs/sec	COAST FUEL I_{sp} sec	TOTAL FUEL lbs
S-138	173	Orbital	I	51.0	124.0	8.10	In				55.4
S-139	169.5	Orbital	I	41.7	117.0	5.69	In				44.0
S-140C	176.5	Orbital	II	41.4	125.0	4.83	In				44.2
S-141C	180	Reentry	I	38.6	115.0	143.72	Out	41.0	0.312	119.4	79.6
S-142C	173	Orbital	II	43.9	122.2	2.47	In				45.0
S-143C	178.5	Orbital	II	37.5	125.0	3.79	In				41.0
S-144CR	177.5	Reentry	II	29.5	113.4	295.69	Out	64.5	0.318	148.5	94.0
S-145C	181	Orbital	II	25.2	132.0	6.64	In				30.1
S-146C	177	Orbital	II	29.5	132.0	3.76	In				31.0
S-147C	179.3	Orbital	II	39.7	110.4	4.06	In				41.0
S-148C	178.5	Orbital	II	40.0	125.0	10.23	In	7.9	0.772	125.0	47.9
S-149C	176.5	Orbital	II	31.9	130.0	3.55	In				33.5
S-150C	177	Orbital	II	33.3	123.0	59.31	Out	25.4	0.441	123.0	58.7
S-151C	173	Orbital	II	30.9	120.0	57.99	Out	15.7	0.256	120.0	46.61
S-152C	179.5	Orbital	II	27.1	130.0	58.78	Out	23.8	0.405	130.0	50.9
S-153C	172	Orbital	II	24.5	112.9	58.12	Out	26.0	0.447	113.6	50.5
S-154C	176	Orbital	II	34.7	135.0	4.80	In	0.7	0.146	135.0	35.4
S-155C	174.5	Orbital	II	35.1	115.5	18.60	In	13.9	0.879	115.5	49.0
S-156C	176.5	Orbital	II	36.0	126.0	1.76	In	1.2	0.684	126.0	37.2
S-157C	178	Orbital	II	32.9	123.5	2.42	In				34.3
S-158C	172.5	Orbital	II	26.5	131.4	59.74	Out	14.4	0.214	117.7	40.9
S-159C	161	Reentry	II	27.8	107.0	141.64	Out	27.5	0.194	101.5	56.8
S-160C	174	Orbital	II	32.6	115.7	3.19	In				33.9
S-161C	174.5	Orbital	II	26.1	123.5	58.76	Out	26.1	0.442	113.0	52.1
S-162C	171.6	Orbital	II	29.1	127.0	4.76	In				38.6
S-163CR	129.8	Orbital	II	37.8	135.6	37.62	Out	22.8	0.606	129.3	60.6
S-164C	185.5	Reentry	II	30.6	136.0	242.98	Out	79.4	0.326	136.0	110.0
S-165C	182.5	Orbital	II	39.5	123.5	3.95	In				43.0
S-166C	176.5	Probe	II	27.5	131.6	5.29	In	12.0			39.5
S-167C	179.9	Orbital	II	40.2	110.3	56.77	Out	33.0	0.498	113.3	73.2
S-168C	180.8	Reentry	II	34.3	114.4	148.02	Out	32.4	0.219	131.9	66.7
S-169C	183.1	Orbital	II	40.8	120.4	24.30	In	36.2	1.39	111.7	77.0
S-170CR	180.1	Orbital	II	27.4	N/A	22.64	In	26.4	1.17	108.1	53.8
S-171C	180.0	Reentry	II	30.4	127.0	142.37	Out	35.1	0.245	119.5	65.5
S-172C	182.2	Orbital	II	26.4	114.7	59.82	Out	26.8	0.449	109.9	53.2
S-173C	187	ORBITAL	IIA	29.0	130.6	23.19	IN	36.5	1.574	108.4	65.3
S-174C	188.5	ORBITAL	IIA	25.5	106.5	16.14	IN	24.5	1.516	123.7	50.0
S-175C	187	ORBITAL	IIA	35.2	139.5	14.56	IN	20.8	1.428	135.0	56.0
S-176C	187	ORBITAL	IIA	44.6	116.8	5.11	IN	11.4	2.230	120.0	56.0
S-177C	181.5	ORBITAL	IIA	33.5	121.9	5.72	IN	6.2	1.084	148.6	39.7

TABLE CCI - SCOUT THIRD-STAGE FUEL CONSUMPTION REACTION CONTROL SYSTEM

VEHICLE	FUEL AT LIFT-OFF lbs	MISSION	BOOST FUEL lbs	BOOST FUEL I_{sp} sec	COAST TIME sec	COAST FUEL lbs	RETRO TIME sec	RETRO FUEL lbs	RETRO I_{sp} sec	RETRO FUEL FLOW RATE lbs/sec
S-138	17.8	Orbital	6.40	123.0	455.25	0.70	8.40	9.70	165.0	1.160
S-139	19.5	Orbital	3.20	132.0	455.42	1.90	10.25	13.20	169.0	1.289
S-140C	19.4	Orbital	5.10	110.0	525.64	0.45	9.18	12.90	157.4	1.406
S-141C	19.2	Reentry	6.20	123.0	11.45	0.50	9.47	11.70	175.8	1.236
S-142C	18.8	Orbital	4.14	130.0	518.84	1.55	9.27	12.10	165.0	1.309
S-143C	18.3	Orbital	9.10	145.0	519.41	0.50	5.92	7.74	165.0	1.310
S-144CR	18.8	Reentry	4.8	144.0	36.74	≈ 0	9.84	13.0	158.4	1.321
S-145C	18.1	Orbital	6.90	122.0	299.68	0.05	8.40	10.20	174.0	1.215
S-146C	18.5	Orbital	5.60	133.5	520.09	≈ 0	9.25	11.90	161.0	1.288
S-147C	18.5	Orbital	6.40	139.7	450.64	0.20	9.00	10.80	172.2	1.200
S-148C	18.4	Orbital	6.50	153.0	299.10	0.15	8.22	10.90	160.5	1.325
S-149C	18.65	Orbital	4.60	115.0	568.82	1.00	8.80	12.20	158.3	1.388
S-150C	18.2	Orbital	5.00	103.0	201.26	0.40	8.73	11.80	157.2	1.353
S-151C	17.7	Orbital	3.40	--	179.14	0.30	10.03	13.30	162.2	1.295
S-152C	18.7	Orbital	2.8	136.0	-	-	-	-	-	-
S-153C	18.5	Orbital	4.2	104.3	77.62	0.5	10.22	12.8	160.5	1.252
S-154C	18.0	Orbital	4.50	121.0	569.40	0.3	8.86	12.40	151.4	1.399
S-155C	18.2	Orbital	6.39	109.3	369.44	0.0	7.86	10.80	151.9	1.376
S-156C	18.9	Orbital	3.22	139.0	572.76	1.5	9.65	13.30	150.0	1.378
S-157C	18.7	Orbital	4.3	121.0	564.45	1.4	9.18	12.0	156.5	1.308
S-158C	18.1	Orbital	5.6	138.7	282.37	1.9	8.28	10.6	161.1	1.280
S-159C	17.9	Reentry	2.1	167.6	8.00	0.6	11.3	14.2	161.5	1.257
S-160C	18.75	Orbital	3.7	119.9	493.34	0.65	10.40	13.4	159.0	1.288
S-161C	17.9	Orbital	5.3	148.0	187.04	0.6	8.1	11.0	151.7	1.364
S-162C	17.1	Orbital	4.2	141.0	568.71	2.1	7.96	9.8	168.7	1.231
S-163CR	18.7	Orbital	3.4	--	234.0	-	10.70	14.3	148.3	1.336
S-164C	18.3	Reentry	5.3	150.0	7.66	0.3	N/A	11.7	N/A	N/A
S-165C	18.6	Orbital	4.6	140.5	443.21	2.2	8.94	10.8	172.8	1.210
S-166C	19.1	Probe	3.85	153.5	15.7	0.25	10.3	14.1	144.0	1.369
S-167C	18.7	Orbital	3.82	125.6	139.26	0.78	9.22	13.1	145.0	1.420
S-168C	18.9	Reentry	2.80	145.7	8.00	--	10.74	15.2	145.2	1.415
S-169C	18.5	Orbital	3.76	137.0	285.80	0.94	9.90	12.3	158.4	1.293
S-170CR	18.4	Orbital	2.95	*	409.5	1.55	10.8	12.8	158.7	1.191
S-171C	18.9	Reentry	3.91	106.2	20.5	0.2	10.6	13.4	159.2	1.26
S-172C	18.5	Orbital	2.08	107.4	218.58	0.72	10.87	14.7	153.4	1.350
S-173C	19.5	ORBITAL	4.70	-	192.03	1.30	8.80	12.5	-	1.420
S-174C	19.1	ORBITAL	3.20	136.4	264.22	1.20	8.32	13.7	157.8	1.647
S-175C	19.5	ORBITAL	3.40	-	*373.31	0.40	11.00	14.7	152.0	1.336
S-176C	19.0	ORBITAL	5.30	150.0	573.78	1.30	9.40	11.5	163.4	1.223
S-177C	18.9	ORBITAL	2.40	123.2	405.94	1.80	8.35	13.7	-	1.641

*T/M Loss.

TABLE CCII - SCOUT SECOND-STAGE INITIAL CONDITIONS AND CAPTURE

VEHICLE	PITCH (Up +)					YAW (Right +)					ROLL (Right +)				
	θ_0 deg	$\dot\theta_0$ deg/sec	$\Delta\dot\theta$ TIP-OFF deg/sec	MAX. θ CAPTURE deg	MAX. $\dot\theta$ deg/sec	ψ_0 deg	$\dot\psi_0$ deg/sec	$\Delta\dot\psi$ TIP-OFF deg/sec	MAX. ψ CAPTURE deg	MAX. $\dot\psi$ deg/sec	ϕ_0 deg	$\dot\phi_0$ deg/sec	$\Delta\dot\phi$ TIP-OFF deg/sec	MAX. ϕ CAPTURE deg	MAX. $\dot\phi$ deg/sec
S-138	+3.10	-0.35	0.0	+3.10	-4.6	+2.1	0.0	0.0	+2.10	-4.0	+1.0	0.0	0.0	None	None
S-139	+1.5	-0.4	0.0	+1.5	-2.1	+2.1	+0.2	0.0	+2.12	-3.1	+1.3	+0.4	0.0	+1.20	-3.5
S-140C	+2.56	-0.3	0.0	-2.56	-3.7	+2.83	+0.28	0.0	+2.83	-4.20	+0.61	-0.1	0.0	None	None
S-141C	+1.0	-0.4	0.0	None	None	+0.4	-0.3	0.0	None	None	+0.7	-0.1	0.0	-0.9	-3.1
S-142C	+0.9	-0.3	0.0	None	None	+2.6	+0.2	0.0	+2.6	-4.0	0.0	-0.8	0.0	None	None
S-143C	+1.85	-0.5	0.0	+1.85	-2.45	+2.25	+0.25	0.0	+2.25	-3.3	+1.44	+0.3	+0.7	+1.44	-2.25
S-144CR	+0.45	-0.35	-0.6	None	None	-0.15	-0.13	-0.35	None	None	0.0	0.0	*	None	None
S-145C	+0.05	+0.30	-2.30	-0.4	-2.0	-0.10	+0.30	-0.90	None	None	+0.55	0.0	-0.60	None	None
S-146C	+1.40	-0.5	0.0	+1.4	-1.5	+0.30	-0.18	0.0	None	None	+0.65	0.0	0.0	None	None
S-147C	+1.20	-0.4	0.0	+1.2	-1.3	+0.42	-0.05	0.0	None	None	+1.88	0.0	0.0	+1.88	+2.6
S-148C	+1.75	-0.45	0.0	+1.75	-2.35	-0.9	+0.15	0.0	None	None	+2.07	+0.5	0.0	+2.07	-1.9
S-149C	+1.0	-0.37	0.0	+1.05	-0.9	-0.7	-0.2	0.0	None	None	+1.1	-0.05	+0.75	+1.15	+0.7
S-150C	+1.35	-0.50	0.0	+1.35	-1.45	+1.1	-0.1	0.0	+1.10	-1.38	+0.4	-0.30	0.0	None	None
S-151C	+1.7	-0.30	0.0	+1.7	-2.25	+1.15	+0.25	+0.45	+1.15	+0.7	+0.20	+0.08	0.0	None	None
S-152C	+0.82	-0.16	+0.82	+0.94	+0.655	-0.43	-0.01	-0.19	None	None	+0.03	-0.1	***	None	None
S-153C	+3.3	-0.4	0.0	+3.3	-4.5	+0.35	+0.25	0.0	None	None	+0.1	-0.25	0.0	None	None
S-154C	+1.21	-0.55	0.0	+1.21	-1.9	+0.18	-0.20	+0.20	None	None	+0.52	-0.2	+0.10	None	None
S-155C	+1.3	-0.1	0.0	+1.35	-1.5	+1.80	-0.03	0.0	+1.85	-2.20	-0.22	+0.28	0.0	None	None
S-156C	+1.6	-0.2	0.0	+1.60	-2.0	+0.1	-0.1	0.0	None	None	+0.1	0.00	-0.20	None	None
S-157C	+1.10	-0.45	+0.10	+1.10	-1.25	-0.30	0.0	0.0	None	None	+0.75	+0.30	***	+0.80	***
S-158C	+0.95	-0.40	0.0	None	None	+0.90	+0.05	+0.30	+0.94	-0.90	+0.83	-0.25	0.0	None	None
S-159C	+1.0	-0.20	0.0	None	None	-0.40	+0.20	0.0	None	None	-0.40	0.0	0.0	None	None
S-160C	+1.75	-0.35	0.0	+1.75	-2.6	+0.65	-0.05	0.0	None	None	+1.45	-0.12	0.0	+1.45	-1.90
S-161C	+0.45	-0.65	-0.15	None	None	-0.48	-0.02	+0.15	None	None	+0.75	+0.38	0.0	None	None
S-162C	-0.35	-0.70	0.0	None	None	+0.40	+0.45	0.0	None	None	+0.65	+0.60	0.0	None	None
S-163CR	+1.3	-0.40	+0.3	+1.3	-2.0	-0.10	-0.4	0.0	None	None	-0.10	-0.5	0.0	None	None
S-164C	+1.15	+0.50	0.0	None	None	+1.00	-0.15	0.0	None	None	+0.28	-0.20	0.0	None	None
S-165C	+0.60	-0.40	+1.10	+0.75	+0.70	-1.40	+0.30	0.0	None	None	-1.25	+0.15	-1.40	-1.25	-2.80
S-166C	+1.30	-0.5	+0.4	+1.3	-2.15	0.0	0.0	-0.2	None	None	-0.40	+0.1	+0.15	None	None
S-167C	+0.85	-0.75	0.0	None	None	+0.60	+0.31	0.0	None	None	-0.10	-0.40	0.0	None	None
S-168C	+0.45	-0.35	0.0	None	None	+0.25	+0.35	0.0	None	None	+0.30	-0.05	0.0	None	None
S-169C	+1.00	-0.20	0.0	+1.00	-0.20	+0.85	+0.10	0.0	+0.95	+1.15	-0.50	+0.20	+0.25	None	None
S-170CR	+0.20	-0.36	-0.15	None	None	+0.35	0.00	None	None	None	-0.72	+0.05	+0.75	None	None
S-171C	+0.6	-0.5	+0.3	None	None	+0.2	0.0	+0.1	None	None	-0.4	-0.3	+0.2	None	None
S-172C	+0.15	+0.10	0.0	+0.65	+0.74	+0.20	+0.25	0.0	None	None	-0.25	0.0	0.0	None	None
S-173C	+0.85	-0.50	+0.40	+0.95	-1.00	-1.40	+0.15	+0.20	-1.40	-1.85	-1.40	-0.45	*	-1.45	+0.70
S-174C	+1.50	-0.50	+0.50	+1.50	-2.40	+0.45	+0.10	0.0	+0.70	+0.80	-0.45	-0.60	+0.30	NONE	NONE
S-175C	+1.20	-0.50	+0.30	+1.25	-1.50	-0.75	-0.50	+0.20	-0.90	+1.25	+0.20	-0.20	0.0	NONE	NONE
S-176C	+1.30	-0.36	0.0	+1.30	-2.00	-0.24	-0.05	0.0	NONE	NONE	+0.65	-0.02	0.0	NONE	NONE
S-177C	**	-0.20	0.0	NONE	NONE	*	+0.20	0.0	NONE	NONE	*	+0.30	0.0	NONE	NONE

*Data Obscured by noise.
**Telemetered matrix lost.
***Data obscured by low signal strength

TABLE CCIII - SCOUT THIRD-STAGE INITIAL CONDITIONS AND CAPTURE

VEHICLE	PITCH (Up +)					YAW (Right +)					ROLL (Right +)				
	θ_0 deg	$\dot{\theta}_0$ deg/sec	$\Delta\dot{\theta}$ TIP-OFF deg/sec	MAX. θ CAPTURE deg	MAX. $\dot{\theta}$ deg/sec	ψ_0 deg	$\dot{\psi}_0$ deg/sec	$\Delta\dot{\psi}$ TIP-OFF deg/sec	MAX. ψ CAPTURE deg	MAX. $\dot{\psi}$ deg/sec	ϕ_0 deg	$\dot{\phi}_0$ deg/sec	$\Delta\dot{\phi}$ TIP-OFF deg/sec	MAX. ϕ CAPTURE deg	MAX. $\dot{\phi}$ deg/sec
S-138	0.00	-2.25	0.00	None	-2.25	+0.25	0.00	0.4	None	None	+0.1	-0.5	*	None	None
S-139	+0.5	+0.6	-1.4	None	None	-0.3	-1.6	-2.5	-1.3	-4.1	-0.05	+0.1	0.00	None	None
S-140C	0.00	+0.5	0.0	None	None	-0.4	-1.15	*	None	None	+0.3	-0.7	*	None	None
S-141C	+0.15	+1.0	0.0	None	None	+0.9	+0.6	+2.0	+1.4	+2.6	-0.3	-2.4	0.00	-0.65	+2.4
S-142C	+0.3	+1.25	+1.35	+0.8	+2.6	-0.25	-0.5	-2.1	-0.6	-2.6	-0.7	+0.75	0.00	None	None
S-143C	+0.15	+0.65	-1.05	-0.5	-1.75	-0.25	-1.0	-0.32	-0.6	-1.32	+0.75	0.00	0.00	None	None
S-144CR	-0.5	-0.95	+1.2	None	None	-0.25	+1.2	-0.6	None	None	+0.95	-1.05	-0.3	None	None
S-145C	+0.05	+0.3	-2.3	-0.4	-2.0	-0.1	+0.3	-0.9	None	None	+0.55	0.00	-0.6	None	None
S-146C	+0.1	+0.75	-0.3	-0.44	-1.8	0.0	+0.25	-2.75	-0.8	-2.5	+0.75	0.00	0.00	None	None
S-147C	-0.75	-0.4	-0.6	-0.75	-1.0	+0.3	-0.2	-0.3	None	None	-0.9	-0.1	0.00	None	None
S-148C	-0.27	-1.1	-0.45	-0.27	-1.55	+0.1	-1.15	+0.9	None	None	-0.35	-0.9	0.00	None	None
S-149C	0.00	+1.05	-1.2	None	None	-0.4	+0.72	0.00	None	None	+0.84	+0.45	+1.95	None	None
S-150C	-0.12	-1.55	-0.35	-0.33	-1.95	-0.35	-0.1	+1.4	None	+1.3	+0.45	-0.4	+0.3	None	None
S-151C	-0.1	-0.3	+0.3	None	None	-0.05	+0.95	+1.85	+0.25	+2.8	+0.3	+0.2	-0.4	None	None
S-152C	+0.42	+0.12	+3.69	+1.28	+3.81	-0.20	+0.12	None	None	None	-1.12	+0.20	-1.48	-1.26	-1.28
S-153C	+0.75	-1.55	*	*	*	+0.10	-1.3	*	*	*	-0.65	+1.55	*	*	*
S-154C	+0.2	+0.40	-1.2	**	+0.75	+0.1	-0.14	+2.65	+0.37	+1.25	+0.85	0.00	0.00	None	None
S-155C	+0.05	-1.35	0.00	None	None	-0.1	+0.15	+0.75	None	None	-0.65	+0.10	0.00	None	None
S-156C	+0.15	-1.3	+0.2	None	None	+0.15	+1.4	0.00	None	None	-0.9	+0.6	0.00	None	None
S-157C	-0.20	-1.60	-1.85	-0.55	-3.45	-0.20	-0.05	0.0	None	None	+0.60	0.0	**	**	**
S-158C	+0.55	+0.15	0.0	None	None	-0.30	+0.05	-0.85	None	None	+0.38	+0.40	-0.20	None	None
S-159C	+0.60	+1.2	-0.40	+1.40	+1.3	-1.3	-0.10	-2.40	-2.20	-2.50	-0.50	+0.40	-0.70	None	None
S-160C	-0.10	-0.05	*	*	*	-0.20	+1.50	*	*	*	+0.17	+0.40	*	*	*
S-161C	+0.35	-0.20	-3.10	+0.35	-3.30	-0.15	-1.88	*	None	None	+1.20	+0.35	*	*	*
S-162C	+0.05	-1.75	0.0	None	None	+0.05	+1.70	-4.10	-0.60	-2.40	-1.00	+0.40	*	-1.00	+1.00
S-163CR	+0.4	+0.2	****	****	****	-0.10	+0.10	****	****	****	+0.4	+0.3	****	****	****
S-164C	-0.75	+1.80	0.0	None	None	-0.60	-2.20	0.0	None	None	-0.10	-0.50	*	*	*
S-165C	-0.60	-0.20	0.0	None	None	-0.30	+1.40	+0.60	+0.50	+2.00	-0.10	+0.60	0.0	None	None
S-166C	+0.30	+1.40	+1.65	*	+3.05	+0.30	+0.90	-2.0	None	None	+0.5	-0.10	0.0	None	None
S-167C	+0.80	-0.20	*	+0.85	-2.20	+0.45	-0.25	-2.35	-0.70	-2.60	-0.40	-1.40	0.0	-0.40	-1.40
S-168C	-0.30	-0.90	-1.30	-1.15	-2.20	+1.05	+1.50	***	***	***	+0.05	-0.05	0.0	None	None
S-169C	+0.45	+0.50	+0.20	None	None	+0.01	***	0.0	None	None	-0.70	-0.70	-1.10	None	None
S-170CR	-0.2	-1.55	****	****	****	0.0	+0.15	****	****	****	+1.1	+0.40	****	****	****
S-171C	+0.5	+1.10	+1.20	+1.4	+2.30	-0.6	-0.7	0.0	None	None	-0.70	-0.70	+0.5	-0.8	-0.7
S-172C	-0.55	+0.58	+0.60	None	None	+0.05	-2.10	+1.70	None	None	+0.10	-0.65	+0.40	None	None
S-173C	-0.20	-1.40	**	**	**	-0.35	+0.60	**	**	**	+0.40	-1.40	**	**	**
S-174C	-0.20	-1.20	*	-0.70	*	+0.30	+0.80	+3.50	+2.05	+4.30	-0.50	-0.25	0.0	-1.15	-0.75
S-175C	-0.15	***	**	**	**	+0.05	+1.30	**	**	**	-0.50	+1.20	**	**	**
S-176C	+0.47	+1.35	+2.40	+0.64	+3.75	+0.11	-1.10	-4.05	-1.89	-5.15	+1.00	-0.60	0.0	NONE	NONE
S-177C	-0.20	+0.85	*	NONE	NONE	+0.15	-1.25	*	NONE	NONE	-0.30	+0.11	*	NONE	NONE

*Data obscured by noise

**Data obscured by low signal strength

***Control motor firing at ignition

****Loss of T/M signal

TABLE CCIV - SCOUT VEHICLE FLIGHT LOADS SUMMARY

VEHICLE	ALTITUDE ft	PEAK WIND SPEED fps	WIND AZIMUTH deg	BENDING MOMENT	
				AT STA. 131 in-lbs	PER CENT OF FLIGHT ALLOWABLE
S-138	39,370	123	281	159,200	41.0
S-139	47,000	53	218	72,400	18.5
S-140C	36,000	106	216	160,100	41.0
S-141C	43,500	150	312	158,300	40.0
S-142C	43,000	159	290	248,000	63.3
S-143C	44,500	44	280	72,800	18.6
S-144CR	36,000	37	186	135,500 *	19.7
S-145C	34,500	111	358	131,900	33.6
S-146C	47,000	32	271	60,000	15.3
S-147C	46,000	96	260	123,100	31.4
S-148C	40,000	93	215	129,500	33.0
S-149C	31,000	39	248	83,000	21.1
S-150C	45,000	63	235	112,500	28.7
S-151C	28,000	182	260	391,000	99.5
S-152C	32,000	164	311	211,000	56
S-153C	19,000	37	063	70,000	18
S-154C	38,300	194	272	265,000	67.7
S-155C	40,000	81	249	124,500	31.7
S-156C	27,000	17	040	15,000	3.8
S-157C	36,000	137	280	198,000	50.4
S-158C	28,000	100	297	160,000	40.8
S-159C	33,000	157	228	196,300	50.0
S-160C	29,000	79	290	194,000	49.4
S-161C	34,000	68	298	64,000	16.3
S-162C	28,000	88	128	142,000	36.2
S-163CR	41,920	32	220	46,800***	15.0
S-164C	37,000	137	272	162,000	41.3
S-165C	42,000	61	190	90,500	23.1
S-166C	43,000	44	259	82,400***	27.0
S-167C	40,000	105	318	128,000	32.6
S-168C	39.000	200	6	90,000	22.9
S-169C	36,000	113	226	118,700	30.2
S-170CR	29,600	49	120	38,200***	12.4
S-171C	27,500	87	300	147,000	37.5
S-172C	46,000	95	298	104,800	26.7
S-173C	26,000	17	180	23,000#	7.5
S-174C	36,000	108	308	133,200	34
S-175C	**	**	**	**	**
S-176C	41,177	61	193	102,225	26
S-177C	39,000	62	024	73,850#	24

*Critical station at 191.0.
**Not calculated.
***Critical station at 103.69.
#Critical station at 103.7.

(k) Spin Table Joint Stiffness

The joint stiffness of the spin table is determined from the observed bending frequency at third-stage ignition. The stiffness and bending frequencies are tabulated in table CCV for vehicles S-138 through S-177. For the early vehicles, only the mean stiffness is given, but for S-139 through S-177 pitch plane, yaw plane, and mean stiffness values are given. Preflight predictions of spin bearing stiffness were begun on a regular basis for vehicles which had preloaded spin bearings. Those predicted values are also tabulated.

TABLE CCV - SCOUT SPIN TABLE JOINT STIFFNESS DATA SUMMARY

VEHICLE	OBSERVED BENDING FREQUENCY* Hz		SPIN TABLE JOINT STIFFNESS (in-lbs/rad) x 10^{-8}			PREDICTED SPIN BEARING JOINT STIFFNESS (in-lbs/rad) x 10^{-8}
	Pitch Plane	Yaw Plane	Pitch Plane	Mean	Yaw Plane	
S-138***	14.04	14.40		0.165		0.132
S-139	14.83	15.50	0.197	0.217	0.236	
S-140C	13.43	13.67	0.130	0.134	0.137	
S-141C***	11.98	11.55	0.210	0.200	0.190	0.178
S-142C	13.76	13.80	0.139	0.140	0.141	
S-143C	14.08	14.25	0.151	0.154	0.157	
S-144CR***	**	10.06	*****	*****	*****	
S-145C	13.16	13.46	0.143	0.148	0.153	
S-146C	13.54	13.59	0.133	0.134	0.135	
S-147C***	13.26	13.13	0.148	0.147	0.146	0.160
S-148C***	13.94	13.50	0.182	0.174	0.165	0.181
S-149C***	14.70	14.99	0.160	0.167	0.174	0.161
S-150C***	12.18	12.64	0.127	0.134	0.142	0.214
S-151C***	13.78	13.66	0.182	0.179	0.177	
S-152C***	14.42	14.55	0.196	0.200	0.203	
S-153C***	13.16	13.12	0.171	0.166	0.161	0.175****
S-154C***	15.18	15.23	0.202	0.203	0.204	
S-155C***	14.40	14.70	0.234	0.256	0.278	
S-156C***	13.60	12.90	0.136	0.126	0.116	
S-157C***	15.5	15.6	0.216	0.219	0.222	
S-158C***	13.83	13.72	0.190	0.188	0.185	
S-159C***	10.95	10.88	0.113	0.131	0.150	
S-160C***	14.2	14.2	*****	*****	*****	
S-161C***	13.6	13.45	0.183	0.181	0.179	
S-162C***	15.3	16.1	0.263	0.257	0.251	
S-163CR***	**	**	*****	*****	*****	
S-164C***	24.8	21.2	*****	*****	*****	
S-165C***	12.5	12.0	*****	*****	*****	
S-166C***	19.3	19.1	*****	*****	*****	
S-167C***	13.3	13.3	*****	*****	*****	
S-168C***	10.7	10.7	0.10	0.10	0.10	
S-169C***	26.9	12.3	0.125	0.130	0.135	
S-170CR***	**	**	*****	*****	*****	
S-171C***	10.8	10.6	*****	*****	*****	
S-172C***	13.88	13.88	0.188	0.188	0.188	
S-173C	**	**	0.225	0.218	0.21	
S-174C	11.4	12.3				
S-175C	15.06#	15.06#				
S-176C	16.1	15.8				
S-177C	12.43	13.4				

* Frequency observed shortly after third-stage ignition with no control motors firing; first bending mode.

** Unreadable

*** Vehicles with preloaded spin bearings.

**** Using revised method of reference 7-1.

***** Not calculated.

\# Validity of data doubtful.

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

(1) Dynamic Response Data

In table CCVI, the peak transient accelerations as recorded by the "D" section longitudinal, transverse, and normal accelerometers are presented for significant flight events. Stage ignitions normally cause the most significant transient accelerations, but transients for other events are included for a few of the vehicles. In addition, the bending frequencies observed when the vehicle experienced these transient accelerations are tabulated. For the first stage, bending response is primarily in the first bending mode. Response in any other mode is indicated by an identifying number in parentheses preceding the frequency. Second-stage response is primarily in the first bending mode.

TABLE CCVI - SCOUT DYNAMIC RESPONSE DATA SUMMARY.

VEHICLE	FIRST STAGE					SECOND STAGE					THIRD STAGE				
	PERCENT FUEL BURNED	OBSERVED BENDING FREQUENCY Hz	PEAK TRANSIENT ACCELERATION "g"			PERCENT FUEL BURNED	OBSERVED BENDING FREQUENCY Hz	PEAK TRANSIENT ACCELERATION g			PERCENT FUEL BURNED	OBSERVED BENDING FREQUENCY Hz	PEAK TRANSIENT ACCELERATION "g"		
			Long.	Norm.	Trans.			Long.	Norm.	Trans.			Long.	Norm.	Trans.
S-138	0	3.18(P)	+7.49	+0.85	+0.52	0	16.80(P)	+9.1	+1.18	+1.04	0	14.04 (P)	+15.09	+1.32	+1.32
		3.18(Y)	-7.15	-1.18	-0.58		17.07(Y)	-1.8	-0.92	-1.04		14.40 (Y)	+3.02	-1.32	-1.32
S-139	0	3.22(P)	+8.56	+1.28	+0.83	0	15.59(P)	+9.77	+1.10	+1.16	0	14.83 (P)	+11.53	+1.43	+1.23
		3.10(Y)	-4.78	-1.41	-0.70		16.24(Y)	-2.83	-1.10	-1.04		15.50 (Y)	[illegible]	[illegible]	-1.48
S-140C	0	3.07(P)	+6.71	+1.24	+0.50	0	16.28(P)	+7.76	+0.70	+0.84	0	13.43 (P)	+8.23	*	*
		3.05(Y)	-2.58	-0.81	-0.60		16.13(Y)	-1.45	-1.30	-0.80		13.67 (Y)	-1.71		
S-141C	0	3.07(P)	+6.44	+0.56	[illegible]	0	16.41(P)	*	*	*	0	11.98 (P)	+11.18	+0.88	+2.21
		3.07(Y)	-1.52	-0.65	[illegible]		15.50(Y)					11.55 (Y)	[illegible]	-1.65	-1.22
S-142C	0	3.13(P)	+6.31	+0.98	+1.26	0	16.07(P)	+9.26	+0.75	+0.53	0	13.76 (P)	*	*	*
		[illegible](Y)	-1.71	+1.16	[illegible]		16.50(Y)	-2.25	-1.17	-0.59		13.80 (Y)			
S-143C	0	3.16(P)	+5.72	-0.71	+0.25	0	16.54(P)	+8.46	[illegible]	+0.29	0	14.08 (P)	*	*	*
		3.13(Y)	-1.07	-0.40	[illegible]		16.42(Y)					14.25 (Y)			
[illegible]	0	[illegible](P)	[illegible]	[illegible]	[illegible]	0	[illegible](P)	[illegible]	[illegible]	[illegible]	0	* (P)	[illegible]	[illegible]	+1.37
		[illegible](Y)	[illegible]	[illegible]	[illegible]		* (Y)	[illegible]	[illegible]	[illegible]		[illegible] (Y)	-0.21	[illegible]	[illegible]
S-145C	0	3.01(P)	+5.45	[illegible]	[illegible]	0	15.55(P)	+8.74	+0.45	+0.27	0	13.16 (P)	*	*	*
		3.10(Y)	-1.03	[illegible]	[illegible]		16.50(Y)	-1.63	-0.27	-0.25		13.46 (Y)			
S-146C	0	3.12(P)	[illegible]	[illegible]	[illegible]	0	15.04(P)	+9.16	[illegible]	+0.47	0	13.54 (P)	+4.41	+0.75	*
		3.06(Y)	-1.57	[illegible]	[illegible]		[illegible](Y)	-1.81	[illegible]	-0.37		13.59 (Y)	+4.03	-0.59	
S-147C	0	3.06(P)	+5.76	[illegible]	+0.65	0	14.87(P)	[illegible]	[illegible]	+0.65	0	13.25 (P)	*	*	*
		3.07(Y)	[illegible]	[illegible]	[illegible]		[illegible](Y)	-2.07	[illegible]	[illegible]		13.13 (Y)			
S-148C	0	3.06(P)	[illegible]	+0.14	[illegible]	0	15.63(P)	+8.51	[illegible]	+0.33	0	[illegible] (P)	*	*	*
		3.04(Y)	-1.63	-0.14	[illegible]		15.61(Y)	-2.11	[illegible]	-0.64		14.50 (Y)			
S-149C	0	3.11(P)	+7.31	+0.31	[illegible]	0	15.96(P)	+11.38	[illegible]	+0.35	0	14.70 (P)	+14.00	+2.18	+2.31
		3.04(Y)	-2.90	[illegible]	[illegible]		15.71(Y)	-2.67	[illegible]	-0.39		[illegible] (Y)	[illegible]	-1.10	-1.87
S-150C	0	3.09(P)	[illegible]	*	[illegible]	0	15.45(P)	[illegible]	[illegible]	+0.44	0	12.18 (P)	+11.80	+1.92	+2.51
		2.96(Y)	-0.35		-0.43		15.60(Y)	[illegible]	[illegible]	[illegible]		12.64 (Y)	+2.07	-1.10	-0.96
S-151C	0	3.0(P)	+6.14	[illegible]	[illegible]	0	6.5 (P)	+9.0	[illegible]	+0.27	0	13.8 (P)	*	*	*
		3.0(Y)	-1.73	[illegible]	[illegible]		6.5 (Y)	-2.14	[illegible]	-0.27		13.7 (Y)			
							14.7 (P)								
							15.4 (Y)								
S-152C	0	2.94(P)	+5.35	[illegible]	[illegible]	0	16.09(P)	[illegible]	+0.35	+0.27	0	14.42 (P)	*	*	*
		13.80(Y)	-1.70	-0.46	-0.40			-2.07	-0.27	-0.23		14.55 (Y)			
S-153C	0	2.93(P)	N/A	-1.52	+0.41	0	14.1(P)	N/A	+0.36	+0.22	0	11.16 (P)	N/A	*	*
		12.90(Y)	N/A	-1.15	-0.47		14.5(Y)	N/A	-0.28	-0.35		11.12 (Y)	N/A		
S-154C	0	3.17(P)	+6.45	[illegible]	+0.31	0	16.15(P)	+9.08	[illegible]	+0.39	0	15.18 (P)	+7.78	+0.51	+0.27
		3.07(Y)	-2.27	-0.47	-0.31		16.20(Y)	-2.14	-0.47	-0.49		15.23 (Y)	+3.47	[illegible]	-0.38
S-155C	0	3.04(P)	+6.18	***	[illegible]	0	16.38(P)	[illegible]	***	+0.34	0	14.40 (P)	+7.85	***	+0.66
		3.08(Y)	-2.47		[illegible]		16.18(Y)	-2.36		-0.35		14.70 (Y)	[illegible]		-1.05
S-156C	0	3.10(P)	[illegible]	[illegible]	[illegible]	0	15.3 (P)	[illegible]	[illegible]	+0.37	0	13.6 (P)	[illegible]	[illegible]	+0.41
		3.08(Y)	[illegible]	[illegible]	[illegible]		16.2 (Y)	[illegible]	[illegible]	-0.57		[illegible] (Y)	[illegible]	[illegible]	[illegible]
S-157C	0	3.08(P)	+5.90	+0.85	[illegible]	0	16.7 (P)	[illegible]	[illegible]	+0.28	0	15.5 (P)	[illegible]	+1.65	+0.46
		3.06(Y)	-2.03	-0.54	[illegible]		16.3 (Y)	[illegible]	[illegible]	[illegible]		15.6 (Y)	+3.67	[illegible]	-1.04
S-158C	0	3.06(P)	+6.79	+0.65	[illegible]	0	[illegible] (P)	[illegible]	[illegible]	[illegible]	0	13.83 (P)	+8.0	+0.59	+1.10
		2.99(Y)	+2.37	-0.56	[illegible]		16.2 (Y)	[illegible]	[illegible]	-0.35		13.72 (Y)	[illegible]	[illegible]	[illegible]
S-159C	0	2.92(P)	+5.52	+0.35	[illegible]	0	[illegible] (P)	[illegible]	+0.31	+0.50	0	10.95 (P)	+7.35	+0.39	+0.87
		2.94(Y)	+1.93	+0.35	[illegible]		[illegible] (Y)	[illegible]	[illegible]	-0.41		10.88 (Y)	+0.33	-0.62	[illegible]
S-160C	0	3.0 (P)	[illegible]	[illegible]	+0.29	0	[illegible] (P)	[illegible]	[illegible]	+0.47	0	[illegible] (P)	****	****	****
		3.0 (Y)	-1.35	[illegible]	[illegible]		[illegible] (Y)	[illegible]	[illegible]	+0.22		[illegible] (Y)	****	****	****
S-161C	0	3.0 (P)	+4.71	+0.59	[illegible]	0	16.0 (P)	[illegible]	[illegible]	[illegible]	0	13.6 (P)	+5.12	****	****
		3.0 (Y)	-1.74	[illegible]	[illegible]			[illegible]	-0.51	-0.23		13.45 (Y)	0	****	****
S-162C	0	3.02(P)	+5.16	[illegible]	+0.29	0	17.2 (P)	[illegible]	[illegible]	+0.20	0	[illegible] (P)	+7.62	[illegible]	[illegible]
		* (Y)	-2.00	-0.50	-0.29		17. (Y)	+1.90	[illegible]	-0.16		16.1 (Y)	[illegible]	-1.15	-1.09
S-163CH	0	3.12(P)	[illegible]	[illegible]	[illegible]	0	* (P)	[illegible]	[illegible]	+0.20	0	* (P)	+7.31	*	*
		* (Y)	+2.66	-0.32	-0.28		* (Y)	+1.02	-0.44	-0.12		* (Y)	[illegible]	*	*
S-164C	0	3.24(P)	+5.30	[illegible]	+0.25	0	15.1 (P)	[illegible]	[illegible]	+0.29	0	24.8 (P)	[illegible]	+0.50	+0.35
		3.25(Y)	-2.30	-0.90	-0.31		* (Y)	[illegible]	[illegible]	-0.33		21.2 (Y)	[illegible]	-0.73	[illegible]
S-165C	0	2.96(P)	+5.7	+0.6	+0.29	0	12.5 (P)	+6.82	[illegible]	+0.60	0	12.5 (P)	****	****	****
		2.98(Y)	-1.0	-0.6	-0.23		12.5 (Y)	-0.96	[illegible]	[illegible]		12.0 (Y)	****	****	****
S-166C	0	3.20(P)	+3.48	+0.30	+0.20	0	7.6 (P)	+5.90	[illegible]	[illegible]	0	17.3 (P)	[illegible]	[illegible]	+0.48
		* (Y)	-2.32	-0.51	-0.20		6.6 (Y)	[illegible]	[illegible]	-0.46		17.1 (Y)	[illegible]	-1.26	+0.58
S-167C	0	3.04(P)	+4.86	+0.78	+0.16	0	15.7 (P)	+5.90	+0.71	+0.24	0	13.3 (P)	+7.67	*	*
		2.95(Y)	+1.61	-0.63	-0.20		16.2 (Y)	[illegible]	-0.71	-0.34		13.3 (Y)	-0.10	*	*
S-168C	0	2.96(P)	[illegible]	+0.35	+0.31	0	37.2 (P)	+6.45	+0.51	+0.47	0	10.7 (P)	+7.93	+0.71	+1.10
		2.98(Y)	-2.33	+0.54	-0.29		[illegible] (Y)	+0.79	-0.43	-0.59		10.7 (Y)	-0.20	-1.51	-0.98
S-169C	0	3.16(P)	+4.85	+0.65	+0.30	0	34.2 (P)	+6.16	+0.55	+0.20	0	26.9 (P)	+7.50	+1.30	+0.60
		3.10(Y)		-0.70	-0.25		34.2 (Y)	-0.85	-0.35	-0.30		12.3 (Y)	+1.40	-1.70	-0.65
S-170CH	0	2.91(P)	+0.92	+0.65	+0.08	0	17.7 (P)	+5.66	+0.67	*	0	** (P)	**	**	**
		2.87(Y)	-0.62	-0.53	-0.08		12.5 (Y)	-1.55	-0.86	*		** (Y)	**	**	**
S-171C	0	2.93(P)	+3.53	+0.48	+0.29	0	* (P)	+6.19	+0.41	+0.53	0	10.8 (P)	+7.16	+0.31	+0.37
		2.98(Y)	-1.82	-0.41	-0.29		* (Y)	-0.62	-0.19	-0.35		10.6 (Y)		0.0	-0.33
S-172C	0	3.0 (P)	+3.30	+0.50	+0.38	0	15.6 (P)	+5.62	+0.31	+0.10	0	13.88 (P)	+7.60	+0.58	+0.19
		3.0 (P)	-0.57	-0.50	-0.31			-1.56	-0.20	[illegible]		13.81 (Y)	-0.20	-0.38	-0.30
S-173C	0	2.92(P)	+5.45	+1.48	+0.33	[illegible]	[illegible](P)	+6.22	+0.79	[illegible]	0	* (P)	*	*	*
		* (Y)	-1.28	-1.64	-0.27		13.40(Y)	-1.11	-0.79	-0.29		* (Y)	*	*	*
S-174C	0	2.92(P)	+4.26	+0.30	+0.10	0	14.4(P)	+5.64	+0.48	+0.49	0	11.4(P)	+6.81#	+0.24	+0.29
		3.03(Y)	-0.72	-0.19	-0.06		14.0(Y)	-0.46	-0.40	-0.17		12.3(Y)	*	*	-0.12
S-175C	0	2.92(P)	+5.91	+0.92	[illegible]	0	* (P)	+6.64	+0.31	+0.65	0	15.06(P)#	*	*	*
		3.04(Y)	-2.35	-0.98	[illegible]		13.92(Y)	-1.57	-1.06	-0.69		15.00(Y)#	*	*	*
S-176C	0	3.14(P)	+4.15	+0.50	+0.33	0	16.4(P)	+5.66	+0.31	+0.33	0	16.1(P)	+2.23	+0.81	+0.76
		* (Y)	-3.12	-0.56	-0.74		16.5(Y)	-1.25	-0.38	-0.37		15.8(Y)	-1.56	-0.94	-0.70
S-177C	0	[illegible](P)	+0.63	+0.38	+0.13	0	5.27(P)	+5.32	+0.56	+0.36	0	12.43(P)	*	*	*
		2.74(Y)	-0.63	-0.21	-0.15		12.80(Y)	-0.63	-0.44	-0.74		13.40(Y)	*	*	*

Longitudinal Acceleration, + = Forward
Normal Acceleration, + = Up
Transverse Acceleration, + = Right
Validity of data doubtful.

* Data not readable
** Data dropout
*** Sensor not installed
**** Signal noise

(m) Average Temperatures or Trends

Table CCVII is a summary of average temperature changes for locations where sufficient measurements were available; these changes were averaged from the maximum changes recorded during individual flights. Probe and reentry missions are, in general, not included in these averages since they involve significantly different separation times from the more common orbital missions. Temperatures which appeared to be dependent upon motor stack or nozzle configuration were averaged only for the most common configuration.

In general, no excessive temperatures were noted. However, it was observed that the averaging reflected in table CC II did not give representative answers for the upper "C" section rate gyro heat shield and X-259 nozzle shroud, since this averaging did not account for flight duration.

TABLE CCVII - SCOUT AVERAGE TEMPERATURE CHANGES OR TRENDS IN THERMAL MEASUREMENTS

VEHICLE SECTION	THERMAL PARAMETER	AVERAGE △ TEMPERATURE °F	NUMBER OF VEHICLES DETERMINING AVERAGE
Base "A"	ALGOL Nozzle	15	16
	Hydraulic Motor Pump*	11	2
	Inboard Bearing Block	33	4
	Inner Skin*	164	2
	Fin #3 Position Potentiometer*	31	2
	Lanyard Release Switch*	111	2
	Servo Amplifier*	39	2
Lower "B" Transition	ALGOL Chamber Pressure Switch*	4	2
	Inner Skin	129	34
Upper "B" Transition	CASTOR I Nozzle Blanket	38	14
	CASTOR II Nozzle**	30	23
	Lower Left Roll Motor Inlet Line*	13	2
	Ambient	72	22
	500-lb Motor Valve (Range Side)*	3	2
	Nitrogen Tank	3	25
Lower "C" Transition	Skin (Ambient)	117	35
	CASTOR Chamber Pressure Transducer*	2	2
	CASTOR Chamber Pressure Switch*	3	2
	CASTOR Safe/Arm Unit*	3	2
Upper "C" Transition	Rate Gyro Heatshield		37
	X259 Nozzle Shroud***		25
	Third-Stage Aft Hat Support	34	10
	J-40 Disconnect Bracket	124	11
	Inside Skin	144	25
	Nitrogen Line	20	15
	Nitrogen Tank	9	27
	Lower Left Roll Motor Valve	28	7
	Left Yaw Motor*	12	2
	Lower Left Roll Motor Inlet Line*	10	2
Lower "D" Transition	Ambient	45	39
	Guidance Package	+5.3, -4.7	42
	Spin Bearing Support (With Cork Protection)	20	17
"E" Section	Separation Battery*	1	2
	Separation Timer*	5	2

* Since only two data points have been used to establish trends in these cases, rather than the four or five considered desirable, these trends must be considered as very general, and subject to more complete verification.

** At Vehicle Sta. 472 approximately 10° from Tower Side.

*** At Vehicle Sta. 228 outside on Range Side.

(n) Second- and Third-Stage Control System and Limit Cycle Parameters

The control system/vehicle limit cycling characteristics during second- and third-stage coast are presented in table CCVIII. The undisturbed limit cycle angular velocity, period, and control motor pulse width, and duty cycle are simulated by varying the control motor thrust and response times. In most cases, the control system deadbands, gain ratios and turn-on response times are not varied from their preflight measured values. The most significant variation in limit cycle parameters results from changes in control motor thrust levels and turn-off time delay. Often, variation in either of the latter two parameters will achieve a simulation of limit cycle characteristics.

Recently, it was found that the most significant difference between predicted and actual limit cycle characteristics during second-stage coast was caused by structural coupling. The firing of a pitch or yaw control motor excites the first two bending modes of vibration such that the total (rigid plus flexible) error signal is temporarily biased toward the outside of the deadband. This effectively increases the turn-off delay time, resulting in larger limit cycle velocities, increased duty cycles and more fuel consumption. The mathematical model used in these simulations does not include vehicle flexibility.

This data is not available for vehicles S-144CR, S-163CR, S-166C, and S-170CR.

(o) Fourth-Stage Spinup

Table CCIX presents the measured spin rate at third-stage separation for the Phase IV and V vehicles. Also presented are the preflight predictions of spin rate and the postflight measurement of the frictional torque in the spin bearing. Early measurements of spin rate were made from the frequencies observed on the postflight signal strength trace or by other means. Later vehicles were equipped with spin motion monitors for accurate spin rate determination. The spin monitor also provided the means to measure the directional torque in the spin bearing. Spin rate predictions were begun on a regular basis with the inclusion of the spin motion monitor, and are tabulated for the later vehicles only.

(p) Thermal Environment Summary

A composite history of temperature data is presented for each vehicle stage. Maximum temperatures and temperature changes are presented for each measurement location and each vehicle.

In table CCX two values are recorded for each measurement. In the upper left corner of each block is the maximum temperature reached

between first-stage ignition and separation of the stage in which the temperature was measured. The lower right corner of the block shows the corresponding temperature rise. The maximum temperature is presented for use in comparison with allowable temperature. The temperature rise is more meaningful for comparison between vehicles with different initial temperatures. For the guidance package in lower "D" section the high and low values about the 180° F control temperature are recorded.

(q) Conditions at Fourth-Stage Burnout

Table CCXI presents a summary of the altitude, velocity, path angle, and flight azimuth at fourth-stage burnout.

TABLE CCVIII - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-138

CONTROL SYSTEM SETTINGS*

PARAMETER	UNITS	PRE-FLIGHT VALUES PITCH	YAW	ROLL	FLIGHT TEST DATA PITCH	YAW	ROLL
1. Deadband	rad	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
2. Delay Time	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
3. Delay Time	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
4. Gain Ratio	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
5. Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	[illegible]	1.0	

LIMIT CYCLE PARAMETERS (NOMINAL)

6. Control Force	lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
7. Duty Cycle	%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
8. Period	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
9. Force Pulse Width	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
10. Acceleration	rad/sec²	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-

* Flight Test Control System Settings (1) through (5) are calculated values that will give Flight Test Limit Cycle Parameters (6) through (10) measured from flight test records

CONTROL SYSTEM SETTINGS*

PARAMETER	UNITS	PRE-FLIGHT VALUES PITCH	YAW	ROLL	FLIGHT TEST DATA PITCH	YAW	ROLL
1. Deadband	rad	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Delay Time	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
3. Delay Time	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
4. Gain Ratio	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
5. Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	-	-	[illegible]

LIMIT CYCLE PARAMETERS (NOMINAL)

6. Control Force	lbs	[illegible]	[illegible]	[illegible]	-	-	[illegible]
7. Duty Cycle	%	[illegible]	[illegible]	[illegible]	-	-	[illegible]
8. Period	sec	[illegible]	5.515	1.316	-	-	[illegible]
9. Force Pulse Width	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
10. Acceleration	rad/sec²	[illegible]	[illegible]	[illegible]	-	-	[illegible]

* Flight Test Control System Settings (1) through (5) are calculated values that will give Flight Test Limit Cycle Parameters (6) through (10) measured from Flight Test Records

S-139

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION PITCH	YAW	ROLL	POST-FLIGHT SIMULATION PITCH	YAW	ROLL
Control Force	lbs	519.0	513.5	45.7	533.0	540.5	-
Acceleration	deg/sec²	23.04	23.20	37.92	24.1	24.4	-
Turn-On Delay	sec	0.0702	0.0709	0.0256	0.0708	0.0709	-
Turn-Off Delay	sec	0.0653	0.0658	0.0243	0.0680	0.0695	-
Deadband	deg	0.7977	0.8024	1.3918	0.7907	0.8024	-
Gain Ratio	sec	0.4873	0.5040	0.4400	0.4873	0.5040	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	6.377	6.563	0.531	7.626	8.265	-
Period	sec	2.301	2.248	9.766	2.006	1.804	-
Pulse Width	sec	0.0734	0.0738	0.0259	0.0763	0.0778	-
Limit Cycle Velocity	deg/sec	0.8453	0.8559	0.4918	0.9202	0.9502	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION PITCH	YAW	ROLL	POST-FLIGHT SIMULATION PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	14.80	-	-	[illegible]
Acceleration	deg/sec²	[illegible]	16.65	60.20	-	-	[illegible]
Turn-On Delay	sec	[illegible]	0.0663	[illegible]	-	-	[illegible]
Turn-Off Delay	sec	[illegible]	[illegible]	0.0315	-	-	[illegible]
Deadband	deg	[illegible]	0.8024	1.3918	-	-	1.3918
Gain Ratio	sec	[illegible]	0.5040	0.4400	-	-	0.4400
Hysteresis	% deadband	1.0	1.0	1.0	-	-	1.0

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.378	2.257	2.014	-	-	4.000
Period	sec	5.002	5.066	3.254	-	-	2.133
Pulse Width	sec	0.0594	0.0572	0.0337	-	-	0.0427
Limit Cycle Velocity	deg/sec	0.4784	[illegible]	1.167	-	-	1.533

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-140C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT VALUES			FLIGHT TEST DATA		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	528.5	519.0	47.6	-	-	-
Acceleration	deg/sec²	24.34	23.66	38.70	-	-	-
Turn-On Delay	sec	0.0933	0.0928	0.0137	-	-	-
Turn-Off Delay	sec	0.0693	0.0713	0.0213	-	-	-
Deadband	deg	[illegible]	0.7850	1.4000	-	-	-
Gain Ratio	sec	0.1603	0.1667	0.4128	-	-	-
Hysteresis	%deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	19.59	8.279	0.423	-	-	-
Period	sec	1.179	1.950	11.721	-	-	-
Pulse Width	sec	0.1095	0.0807	0.0232	-	-	-
Limit Cycle Velocity	deg/sec	1.2100	0.9557	[illegible]	-	-	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT VALUES			FLIGHT TEST DATA		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.60	50.45	15.75	-	-	-
Acceleration	deg/sec²	16.75	16.70	76.40	-	-	-
Turn-On Delay	sec	0.0607	0.0553	0.0154	-	-	-
Turn-Off Delay	sec	0.0548	0.0558	0.0125	-	-	-
Deadband	deg	0.5000	0.7850	1.4	-	-	-
Gain Ratio	sec	0.1607	0.1457	0.4129	-	-	-
Hysteresis	%deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.434	2.599	2.456	-	-	-
Period	sec	3.941	4.659	2.809	-	-	-
Pulse Width	sec	0.0601	0.0607	0.0345	-	-	-
Limit Cycle Velocity	deg/sec	0.5036	0.5067	1.328	-	-	-

S-141C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Acceleration	deg/sec²	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Turn-Off Delay	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Period	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Pulse Width	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-

* [illegible] Configuration

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Acceleration	deg/sec²	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Turn-Off Delay	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	-	-	[illegible]

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Period	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Pulse Width	sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	-	-	[illegible]

S-142C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	532.0	524.5	41.5	548.0	-	-
Acceleration	deg/sec²	24.72	24.35	35.59	25.5	-	-
Turn-On Delay	sec	0.0918	0.0207	0.0305	0.0270	-	-
Turn-Off Delay	sec	0.0773	0.0783	0.0220	0.0820	-	-
Deadband (half-width)	deg	0.7333	0.8034	1.3028	0.7333	-	-
Gain Ratio	sec	0.5052	0.5150	0.4475	0.5052	-	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	12.19	11.95	0.413	15.19	-	-
Period	sec	1.429	1.481	11.48	1.212	-	-
Pulse Width	sec	0.0871	0.0885	0.0217	0.0921	-	-
Limit Cycle Velocity	deg/sec	1.077	1.078	0.0221	1.174	-	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	43.75	41.40	14.24	-	-	14.60
Acceleration	deg/sec²	16.80	16.70	60.90	-	-	72.00
Turn-On Delay	sec	0.0603	0.0709	0.0440	-	-	0.0441
Turn-Off Delay	sec	0.0779	0.0744	0.3039	-	-	0.0352
Deadband (half-width)	deg	0.7833	0.8014	1.3826	-	-	1.3028
Gain Ratio	sec	0.5052	0.5155	0.4475	-	-	0.4475
Hysteresis	% deadband	1.0	1.0	1.0	-	-	1.0

LIMIT CYCLE PARAMETERS

Duty Cycle	%	6.001	6.098	1.884	-	-	3.094
Period	sec	2.811	2.849	3.397	-	-	2.415
Pulse Width	sec	0.0844	0.086	0.032	-	-	0.0374
Limit Cycle Velocity	deg/sec	0.7085	0.7254	1.3166	-	-	1.345

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-143C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	-	-	-
Acceleration	deg/sec²	[illegible]	[illegible]	[illegible]	-	-	-
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	-	-	-
Turn-Off Delay	sec	[illegible]	0.0753	0.0218	-	-	-
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	-	-	-
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	-	-	-
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	-	-	-
Period	sec	[illegible]	[illegible]	[illegible]	-	-	-
Pulse Width	sec	[illegible]	[illegible]	[illegible]	-	-	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	-	-	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	14.63	-	-	-
Acceleration	deg/sec²	[illegible]	[illegible]	[illegible]	-	-	-
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	-	-	-
Turn-Off Delay	sec	0.0554	0.0359	0.0319	-	-	-
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	-	-	-
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	-	-	-
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.835	[illegible]	2.278	-	-	-
Period	sec	[illegible]	[illegible]	2.963	-	-	-
Pulse Width	sec	[illegible]	[illegible]	[illegible]	-	-	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	-	-	-

S-145C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Acceleration	deg/sec²	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Turn-Off Delay	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Period	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Pulse Width	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	-	-	-
Acceleration	deg/sec²	[illegible]	[illegible]	[illegible]	-	-	-
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	-	-	-
Turn-Off Delay	sec	[illegible]	[illegible]	[illegible]	-	-	-
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	-	-	-
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	-	-	-
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	-	-	-
Period	sec	[illegible]	[illegible]	[illegible]	-	-	-
Pulse Width	sec	[illegible]	[illegible]	[illegible]	-	-	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	-	-	-

S-146C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	526.5	519.5	45.11	514.0	-	-
Acceleration	deg/sec²	24.15	21.83	[illegible]	24.50	-	-
Turn-On Delay	sec	0.0985	0.0963	0.0156	0.0985	-	-
Turn-Off Delay	sec	0.0705	0.0698	0.0737	0.1500	-	-
Deadband (half-width)	deg	0.8011	0.7894	1.4156	0.8011	-	-
Gain Ratio	sec	0.4850	0.4800	0.4275	0.4850	-	-
Hysteresis	% deadband	1.40	0.80	1.77	1.40	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	8.375	7.968	0.5289	8.785	-	-
Period	sec	1.918	1.981	10.051	2.011	-	-
Pulse Width	sec	0.0803	0.0789	0.0266	0.0828	-	-
Limit Cycle Velocity	deg/sec	0.9700	0.9603	0.4901	1.0135	-	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.25	50.85	14.39	-	-	-
Acceleration	deg/sec²	17.45	17.63	70.00	-	-	-
Turn-On Delay	sec	0.0705	0.0658	0.0332	-	-	-
Turn-Off Delay	sec	0.0600	0.0561	0.0288	-	-	-
Deadband (half-width)	deg	0.8011	0.7894	1.4156	-	-	-
Gain Ratio	sec	0.4850	0.4800	0.4275	-	-	-
Hysteresis	% deadband	1.40	0.80	1.77	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.335	2.846	1.657	-	-	-
Period	sec	3.992	4.309	3.726	-	-	-
Pulse Width	sec	0.0666	0.0613	0.0309	-	-	-
Limit Cycle Velocity	deg/sec	0.5808	0.5404	1.0003	-	-	-

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-147C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	506.	[illegible]	-	-	-
Acceleration	deg/sec^2	22.61	22.81	34.79	-	-	-
Turn-On Delay	sec	0.097	0.108	0.076	-	-	-
Turn-Off Delay	sec	0.069	0.074	0.020	-	-	-
Deadband (half-width)	deg	[illegible]	0.794	1.16	-	-	-
Gain Ratio	sec	0.503	[illegible]	[illegible]	-	-	-
Hysteresis	% deadband	[illegible]	[illegible]	0.99	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	7.35	8.20	0.311	-	-	-
Period	sec	2.11	1.91	13.89	-	-	-
Pulse Width	sec	[illegible]	[illegible]	0.022	-		-
Limit Cycle Velocity	deg/sec	[illegible]	0.95	0.14	-		-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.1	50.1	14.0	-	-	-
Acceleration	deg/sec^2	15.84	16.16	59.80	-	-	-
Turn-On Delay	sec	0.076	0.069	0.034	-	-	-
Turn-Off Delay	sec	0.063	0.071	0.032	-	-	-
Deadband (half-width)	deg	0.795	0.724	1.165	-	-	-
Gain Ratio	sec	0.502	0.493	0.435	-	-	-
Hysteresis	% deadband	0.89	0.79	0.99	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.27	3.05	1.58	-	-	-
Period	sec	4.23	4.36	4.27	-	-	-
Pulse Width	sec	0.069	0.066	0.034	-	-	-
Limit Cycle Velocity	deg/sec	0.55	0.54	1.01	-	-	-

S-148C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Acceleration	deg/sec^2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Turn-Off Delay	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Period	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--
Pulse Width	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	--	--	--
Acceleration	deg/sec^2	[illegible]	[illegible]	[illegible]	--	--	--
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	--	--	--
Turn-Off Delay	sec	[illegible]	[illegible]	[illegible]	--	--	--
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	--	--	--
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	--	--	--
Hysteresis	% deadband	[illegible]	[illegible]	[illegible]	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	--	--	--
Period	sec	[illegible]	[illegible]	[illegible]	--	--	--
Pulse Width	sec	[illegible]	[illegible]	[illegible]	--	--	--
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	--	--	--

S-149C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	[illegible]	--	--
Acceleration	deg/sec^2	25.50	[illegible]	[illegible]	26.3	--	--
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	[illegible]	--	--
Turn-Off Delay	sec	[illegible]	[illegible]	0.021	[illegible]	--	--
Deadband (half-width)	deg	0.793	[illegible]	[illegible]	[illegible]	--	--
Gain Ratio	sec	0.512	0.491	[illegible]	[illegible]	--	--
Hysteresis	% deadband	1.165	0.975	1.165	[illegible]	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	9.743	10.76	0.380	6.15	--	--
Period	sec	1.621	1.516	11.99	2.13	--	--
Pulse Width	sec	0.079	0.081	0.023	0.065	--	--
Limit Cycle Velocity	deg/sec	1.007	1.058	0.423	0.060	--	--

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	51.1	18.0	--	--	--
Acceleration	deg/sec^2	[illegible]	[illegible]	[illegible]	--	--	--
Turn-On Delay	sec	0.063	0.063	[illegible]	--	--	--
Turn-Off Delay	sec	0.059	[illegible]	[illegible]	--	--	--
Deadband (half-width)	deg	0.793	[illegible]	1.439	--	--	--
Gain Ratio	sec	0.512	0.491	0.443	--	--	--
Hysteresis	% deadband	1.165	0.975	1.165	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.138	2.861	1.381	--	--	--
Period	sec	4.098	4.348	4.163	--	--	--
Pulse Width	sec	0.064	0.062	0.028	--	--	--
Limit Cycle Velocity	deg/sec	0.550	0.536	1.004	--	--	--

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-150C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	527.5	520.5	44.48	577.0	534.0	--
Acceleration	deg/sec^2	23.96	23.65	35.71	26.30	24.20	--
Turn-On Delay	sec	0.076	0.073	0.024	0.076	0.073	--
Turn-Off Delay	sec	0.042	0.044	0.019	0.059	0.062	--
Deadband (half-width)	deg	0.816	0.793	1.438	0.816	0.793	--
Gain Ratio	sec	0.466	0.500	0.443	0.466	0.500	--
Hysteresis	% deadband	1.400	0.995	2.008	1.400	0.995	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.169	2.407	0.311	5.930	5.953	--
Period	sec	4.298	3.982	13.572	2.761	2.253	--
Pulse Width	sec	0.046	0.043	0.021	0.067	0.068	--
Limit Cycle Velocity	deg/sec	0.559	0.567	0.373	0.852	0.802	--

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.76	45.95	14.05	--	--	--
Acceleration	deg/sec^2	15.70	15.16	59.52	--	--	--
Turn-On Delay	sec	0.067	0.063	0.059	--	--	--
Turn-Off Delay	sec	0.058	0.055	0.056	--	--	--
Deadband (half-width)	deg	0.816	0.793	1.437	--	--	--
Gain Ratio	sec	0.466	0.500	0.443	--	--	--
Hysteresis	% deadband	1.40	0.995	2.008	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	0.668	2.301	6.926	--	--	--
Period	sec	4.367	5.272	1.779	--	--	--
Pulse Width	sec	0.065	0.062	0.062	--	--	--
Limit Cycle Velocity	deg/sec	0.510	0.460	1.303	--	--	--

S-151C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	570.0	531.0	45.69			
Acceleration	deg/sec^2	24.17	24.21	[illegible]			
Turn-On Delay	sec	0.0707	0.0735	0.0231	NOT EVALUATED		
Turn-Off Delay	sec	0.0431	0.0370	0.0178			
Deadband (half-width)	deg	0.793	0.791	1.435			
Gain Ratio	sec	0.503	0.459	0.447			
Hysteresis	% deadband	0.595	0.970	0.993			

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.379	1.699	0.315			
Period	sec	3.966	4.812	13.499	NOT EVALUATED		
Pulse Width	sec	0.0472	0.0407	0.021			
Limit Cycle Velocity	deg/sec	0.570	0.495	0.373			

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	50.05	14.65	--	--	--
Acceleration	deg/sec^2	15.33	15.53	60.63	--	--	--
Turn-On Delay	sec	0.0643	0.0634	0.0366	--	--	--
Turn-Off Delay	sec	0.0552	0.0564	0.0305	--	--	--
Deadband (half-width)	deg	0.791	0.791	1.435	--	--	--
Gain Ratio	sec	0.503	0.459	0.479	--	--	--
Hysteresis	% deadband	[illegible]	0.990	0.915	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	2.662	1.447	--	--	--
Period	sec	5.316	4.801	4.490	--	--	--
Pulse Width	sec	[illegible]	0.064	0.032	--	--	--
Limit Cycle Velocity	deg/sec	0.462	0.495	0.935	--	--	--

S-152C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	524	499.5	41.861	524	499.5	--
Acceleration	deg/sec^2	23.98	22.87	73.68	23.98	22.87	--
Turn-On Delay	sec	0.0781	0.0678	0.0273	0.0781	0.0678	--
Turn-Off Delay	sec	0.0431	0.0458	0.0156	0.063*	0.067*	--
Deadband (half-width)	deg	0.801	0.7765	1.3921	0.801	0.7765	--
Gain Ratio	sec	0.4756	0.5085	0.4333	0.4756	0.5085	--
Hysteresis	% deadband	0.800	1.187	1.945	0.800	1.187	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.3343	2.6684	0.3018	5.8246	7.1368	--
Period	sec	4.0951	3.7577	14.0323	2.3017	2.479	--
Pulse Width	sec	0.0478	0.0501	0.02118	0.0656	0.07475	--
Limit Cycle Velocity	deg/sec	0.5731	0.5733	0.3566	0.862	0.938	--

* Effective time delay including effects of structural coupling.

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.0	49.7	14.35	--	--	--
Acceleration	deg/sec^2	14.12	14.23	61.65	--	--	--
Turn-On Delay	sec	0.0641	0.0944	0.0427	--	--	--
Turn-Off Delay	sec	0.0391	0.0557	0.0342	--	--	--
Deadband (half-width)	deg	0.801	0.7765	1.3921	--	--	--
Gain Ratio	sec	0.4756	0.5085	0.4333	--	--	--
Hysteresis	% deadband	0.800	1.187	1.945	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.4013	2.3555	2.1958	--	--	--
Period	sec	5.3929	5.3723	3.3761	--	--	--
Pulse Width	sec	0.06475	0.06327	0.03701	--	--	--
Limit Cycle Velocity	deg/sec	0.4636	0.4502	1425	--	--	--

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-153C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	530.0	505.5	44.91	530.5	546.0	-
Acceleration	deg/sec^2	[illegible]	22.4	34.9	23.5	24.2	-
Turn-On Delay	sec	0.103	0.102	0.026	0.1035	0.1027	-
Turn-Off Delay	sec	0.063	0.068	0.020	0.057	0.068	-
Deadband (half-width)	deg	0.802	0.802	1.432	[illegible]	0.502	-
Gain Ratio	sec	0.5	0.5	0.45	2.0	2.0	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	6.17	6.82	[illegible]	4.71	[illegible]	-
Period	sec	[illegible]	2.27	[illegible]	2.75	2.0	-
Pulse Width	sec	[illegible]	0.077	0.021	0.065	[illegible]	-
Limit Cycle Velocity	deg/sec	[illegible]	0.866	[illegible]	0.762	[illegible]	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	48.35	50.2	14.12	-	-	-
Acceleration	deg/sec^2	14.7	15.3	58.7	-	-	-
Turn-On Delay	sec	0.065	0.064	0.040	-	-	-
Turn-Off Delay	sec	0.054	0.055	0.029	-	-	-
Deadband (half-width)	deg	0.802	0.802	1.432	-	-	-
Gain Ratio	sec	0.5	0.5	0.45	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.05	2.27	1.28	-	-	-
Period	sec	3.76	5.31	4.78	-	-	-
Pulse Width	sec	0.066	0.060	0.031	-	-	-
Limit Cycle Velocity	deg/sec	0.435	0.462	0.899	-	-	-

S-154C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	512.500	[illegible]	43.537	-	-	-
Acceleration	deg/sec^2	[illegible]	[illegible]	35.74	-	-	-
Turn-On Delay	sec	[illegible]	[illegible]	[illegible]	-	-	-
Turn-Off Delay	sec	[illegible]	[illegible]	[illegible]	-	-	-
Deadband (half-width)	deg	[illegible]	[illegible]	[illegible]	-	-	-
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	-	-	-
Hysteresis	% deadband	1.605	[illegible]	1.515	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	6.315	8.427	[illegible]	-	-	-
Period	sec	2.290	1.357	11.321	-	-	-
Pulse Width	sec	0.072	[illegible]	0.024	-	-	-
Limit Cycle Velocity	deg/sec	0.360	[illegible]	0.433	-	-	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	49.100	14.938	-	-	-
Acceleration	deg/sec^2	[illegible]	[illegible]	73.727	-	-	-
Turn-On Delay	sec	[illegible]	0.065	[illegible]	-	-	-
Turn-Off Delay	sec	0.062	0.059	0.030	-	-	-
Deadband (half-width)	deg	0.782	0.770	1.343	-	-	-
Gain Ratio	sec	[illegible]	0.450	0.427	-	-	-
Hysteresis	% deadband	[illegible]	1.005	1.515	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.003	2.493	1.984	-	-	-
Period	sec	[illegible]	6.154	3.213	-	-	-
Pulse Width	sec	[illegible]	0.064	0.032	-	-	-
Limit Cycle Velocity	deg/sec	0.510	0.460	1.178	-	-	-

S-155C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	513	513.5	41.662	518	522.22	-
Acceleration	deg/sec^2	23.591	21.356	33.47	23.591	23.706	-
Turn-On Delay	sec	0.08792	0.10735	0.02163	0.08792	0.10735	-
Turn-Off Delay	sec	0.07345	0.06032	0.01806	0.07215	0.072	-
Deadband (half-width)	deg	0.802	0.8123	1.4102	0.802	0.8123	-
Gain Ratio	sec	0.5076	0.49006	0.4462	0.5076	0.49006	-
Hysteresis	% deadband	2.71	2.75	3.995	2.71	2.75	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	9.4644	5.6612	0.3356	9.0171	8.88	-
Period	sec	1.7576	2.5159	13.350	1.6426	1.09	-
Pulse Width	sec	0.08317	0.07122	0.02247	0.08172	0.084	-
Limit Cycle Velocity	deg/sec	0.98104	0.83272	0.3760	0.964	0.909	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.55	48.95	15.013	-	-	-
Acceleration	deg/sec^2	15.93	15.79	65.686	-	-	-
Turn-On Delay	sec	0.0618	0.0702	0.03562	-	-	-
Turn-Off Delay	sec	0.06065	0.06155	0.0299	-	-	-
Deadband (half-width)	deg	0.802	0.8123	1.4102	-	-	-
Gain Ratio	sec	0.5076	0.49006	0.4462	-	-	-
Hysteresis	% deadband	2.71	2.75	3.995	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.1830	3.2211	1.8616	-	-	-
Period	sec	4.2661	4.3451	3.573	-	-	-
Pulse Width	sec	0.0679	0.0700	0.0333	-	-	-
Limit Cycle Velocity	deg/sec	0.5425	0.5525	1.0956	-	-	-

between first-stage ignition and separation of the stage in which the temperature was measured. The lower right corner of the block shows the corresponding temperature rise. The maximum temperature is presented for use in comparison with allowable temperature. The temperature rise is more meaningful for comparison between vehicles with different initial temperatures. For the guidance package in lower "D" section the high and low values about the 180° F control temperature are recorded.

(q) Conditions at Fourth-Stage Burnout

Table CCXI presents a summary of the altitude, velocity, path angle, and flight azimuth at fourth-stage burnout.

TABLE CCVIII - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-138

CONTROL SYSTEM SETTINGS*

PARAMETER	UNITS	PRE-FLIGHT VALUES			FLIGHT TEST DATA		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
1. Deadband	rad	0.0137	0.0140	0.0247	0.0137	0.0140	-
2. Delay Time	sec	0.0885	0.0835	0.0100	0.0888	0.0849	-
3. Delay Time	sec	0.0602	0.0541	0.0068	0.0770	0.0730	-
4. Gain Ratio	sec	0.484	0.472	0.462	0.486	0.472	-
5. Hysteresis	$ deadband	2.0	2.0	2.0	1.0	1.0	

LIMIT CYCLE PARAMETERS (NOMINAL)

6. Control Force	lbs	517.5	514.0	45.7	562.0	534.0	-
7. Duty Cycle	$	5.75	4.161	0.744	12.13	6.96	-
8. Period	sec	2.377	2.061	7.914	1.148	1.816	-
9. Force Pulse Width	sec	0.0684	0.0614	0.0294	0.0693	0.0604	-
10. Acceleration	rad/sec²	0.4190	0.4165	0.7010	0.455	0.434	-

* Flight Test Control System Settings (1) through (5) are calculated values that will give Flight Test Limit Cycle Parameters (6) through (10) measured from flight test records

CONTROL SYSTEM SETTINGS*

PARAMETER	UNITS	PRE-FLIGHT VALUES			FLIGHT TEST DATA		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
1. Deadband	rad	0.0137	0.0140	0.0247	-	-	0.0247
2. Delay Time	sec	0.0807	0.0320	0.0353	-	-	0.0353
3. Delay Time	sec	0.0544	0.0101	0.0087	-	-	0.0124
4. Gain Ratio	sec	0.485	0.472	0.462	-	-	0.4600
5. Hysteresis	$ deadband	2.0	2.0	2.0	-	-	1.0

LIMIT CYCLE PARAMETERS (NOMINAL)

6. Control Force	lbs	48.6	49.2	15.7	-	-	15.75
7. Duty Cycle	$	2.491	2.083	1.864	-	-	1.8529
8. Period	sec	4.873	5.515	7.314	-	-	2.1348
9. Force Pulse Width	sec	0.0607	0.0558	0.0198	-	-	0.0404
10. Acceleration	rad/sec²	0.2804	0.2836	1.294	-	-	1.300

* Flight Test Control System Settings (1) through (5) are calculated values that will give Flight Test Limit Cycle Parameters (6) through (10) measured from Flight Test Records

S-139

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	510.0	513.5	45.7	533.0	540.5	-
Acceleration	deg/sec²	23.04	23.20	37.92	24.1	24.4	-
Turn-On Delay	sec	0.0902	0.0929	0.0256	0.0908	0.0929	-
Turn-Off Delay	sec	0.0653	0.0658	0.0243	0.0680	0.0695	-
Deadband	deg	0.7907	0.8024	1.3918	0.7907	0.8024	-
Gain Ratio	sec	0.4873	0.5040	0.4400	0.4873	0.5040	-
Hysteresis	$ deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	$	6.377	6.563	0.531	7.626	8.265	-
Period	sec	2.301	2.248	9.766	2.006	1.884	-
Pulse Width	sec	0.0734	0.0738	0.0259	0.0763	0.0778	-
Limit Cycle Velocity	deg/sec	0.8453	0.8559	0.4918	0.9202	0.9502	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	48.65	50.45	14.80	-	-	15.38
Acceleration	deg/sec²	16.09	16.65	69.20	-	-	71.80
Turn-On Delay	sec	0.0568	0.0563	0.0444	-	-	0.0444
Turn-Off Delay	sec	0.0548	0.0528	0.0315	-	-	0.0400
Deadband	deg	0.7907	0.8024	1.3918	-	-	1.3918
Gain Ratio	sec	0.4873	0.5040	0.4400	-	-	0.4400
Hysteresis	$ deadband	1.0	1.0	1.0	-	-	1.0

LIMIT CYCLE PARAMETERS

Duty Cycle	$	2.378	2.257	2.074	-	-	4.000
Period	sec	5.002	5.066	3.254	-	-	2.133
Pulse Width	sec	0.0594	0.0572	0.0337	-	-	0.0427
Limit Cycle Velocity	deg/sec	0.4784	0.4760	1.167	-	-	1.533

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

SECOND STAGE

THIRD STAGE

S-140C

Second Stage

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT VALUES			FLIGHT TEST DATA		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	528.5	519.0	47.6	-	-	-
Acceleration	deg/sec^2	24.34	23.66	38.70	-	-	-
Turn-On Delay	sec	0.0933	0.0928	0.0337	-	-	-
Turn-Off Delay	sec	0.0693	0.0713	0.0213	-	-	-
Deadband	deg	0.8080	0.7850	1.4000	-	-	-
Gain Ratio	sec	0.4609	0.4667	0.4128	-	-	-
Hysteresis	%deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	18.59	8.279	0.420	-	-	-
Period	sec	1.178	1.950	11.021	-	-	-
Pulse Width	sec	0.1095	0.0807	0.0232	-	-	-
Limit Cycle Velocity	deg/sec	1.1120	0.9552	0.4484	-	-	-

Third Stage

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT VALUES			FLIGHT TEST DATA		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.60	50.45	15.75	-	-	-
Acceleration	deg/sec^2	16.75	16.70	76.40	-	-	-
Turn-On Delay	sec	0.0607	0.0553	0.0354	-	-	-
Turn-Off Delay	sec	0.0548	0.0558	0.0325	-	-	-
Deadband	deg	0.8080	0.7850	1.4	-	-	-
Gain Ratio	sec	0.4609	0.4667	0.4128	-	-	-
Hysteresis	%deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	7.434	2.599	2.456	-	-	-
Period	sec	3.941	4.669	2.809	-	-	-
Pulse Width	sec	0.0601	0.0607	0.0345	-	-	-
Limit Cycle Velocity	deg/sec	0.5036	0.5067	1.318	-	-	-

S-141C

Second Stage

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	519.4	[illegible]	[illegible]	[illegible]	-
Acceleration	deg/sec^2	[illegible]	23.03	37.24	[illegible]	[illegible]	-
Turn-On Delay	sec	[illegible]*	[illegible]*	[illegible]	[illegible]	[illegible]	-
Turn-Off Delay	sec	[illegible]*	[illegible]*	[illegible]	[illegible]	[illegible]	-
Deadband (half-width)	deg	[illegible]	1.3751	1.4000	[illegible]	[illegible]	-
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	[illegible]	3.541	-
Period	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Pulse Width	sec	0.0451	0.0477	[illegible]	[illegible]	[illegible]	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-

* Filter-Out Configuration

Third Stage

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	[illegible]	[illegible]	-	-	[illegible]
Acceleration	deg/sec^2	[illegible]	[illegible]	69.07	-	-	[illegible]
Turn-On Delay	sec	[illegible]	0.0600	0.0336	-	-	0.0336
Turn-Off Delay	sec	[illegible]	[illegible]	0.0364	-	-	0.0410
Deadband (half-width)	deg	[illegible]	1.3751	1.4000	-	-	1.4000
Gain Ratio	sec	[illegible]	[illegible]	[illegible]	-	-	0.4472
Hysteresis	% deadband	1.0	1.0	1.0	-	-	1.0

LIMIT CYCLE PARAMETERS

Duty Cycle	%	1.0229	0.9766	1.864	-	-	4.0910
Period	sec	[illegible]	11.675	3.465	-	-	2.100
Pulse Width	sec	[illegible]	0.0570	0.0321	-	-	0.0432
Limit Cycle Velocity	deg/sec	[illegible]	0.4136	1.1085	-	-	[illegible]

S-142C

Second Stage

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	532.0	524.5	43.5	548.0	-	-
Acceleration	deg/sec^2	24.72	24.36	35.59	25.5	-	-
Turn-On Delay	sec	0.0918	0.0907	0.0305	0.0950	-	-
Turn-Off Delay	sec	0.0779	0.0783	0.0290	0.0820	-	-
Deadband (half-width)	deg	0.7833	0.8034	1.3828	0.7833	-	-
Gain Ratio	sec	0.5052	0.5150	0.4475	0.5052	-	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	12.19	11.95	0.413	15.19	-	-
Period	sec	1.429	1.481	11.48	1.212	-	-
Pulse Width	sec	0.0871	0.0885	0.0237	0.0921	-	-
Limit Cycle Velocity	deg/sec	1.077	1.078	0.4201	1.174	-	-

Third Stage

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.75	49.40	14.24	-	-	14.60
Acceleration	deg/sec^2	16.80	16.70	64.00	-	-	79.00
Turn-On Delay	sec	0.0603	0.0709	0.0446	-	-	0.0446
Turn-Off Delay	sec	0.0779	0.0793	0.0299	-	-	0.0350
Deadband (half-width)	deg	0.7833	0.8034	1.3828	-	-	1.3828
Gain Ratio	sec	0.5052	0.5150	0.4475	-	-	0.4475
Hysteresis	% deadband	1.0	1.0	1.0	-	-	1.0

LIMIT CYCLE PARAMETERS

Duty Cycle	%	6.001	6.098	1.884	-	-	3.094
Period	sec	2.811	2.849	3.397	-	-	2.415
Pulse Width	sec	0.0844	0.066	0.032	-	-	0.0374
Limit Cycle Velocity	deg/sec	0.7085	0.7254	1.1186	-	-	1.345

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-143C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	525.0	524.0	43.35	-	-	-
Acceleration	deg/sec^2	24.15	24.05	37.03	-	-	-
Turn-On Delay	sec	0.1018	0.1008	0.0314	-	-	-
Turn-Off Delay	sec	0.0760	0.0753	0.0216	-	-	-
Deadband (half-width)	deg	0.7810	0.7717	1.3719	-	-	-
Gain Ratio	sec	0.4830	0.4808	0.4365	-	-	-
Hysteresis	% deadband	2.16	0.79	1.08	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	11.24	10.30	0.4920	-	-	-
Period	sec	1.575	1.650	11.091	-	-	-
Pulse Width	sec	0.0885	0.0856	0.0234	-	-	-
Limit Cycle Velocity	deg/sec	1.0686	1.0235	0.4333	-	-	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.05	50.90	14.63	-	-	-
Acceleration	deg/sec^2	16.81	17.11	71.60	-	-	-
Turn-On Delay	sec	0.0623	0.0614	0.0406	-	-	-
Turn-Off Delay	sec	0.0559	0.0559	0.0319	-	-	-
Deadband (half-width)	deg	0.7910	0.7717	1.3719	-	-	-
Gain Ratio	sec	0.4830	0.4808	0.4365	-	-	-
Hysteresis	% deadband	2.16	0.79	1.08	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.835	2.778	2.278	-	-	-
Period	sec	4.401	4.378	2.968	-	-	-
Pulse Width	sec	0.0624	0.0608	0.0340	-	-	-
Limit Cycle Velocity	deg/sec	0.5263	0.5202	1.218	-	-	-

S-145C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	493.5	524.0	42.94	520.4	[illegible]	-
Acceleration	deg/sec^2	22.20	23.57	[illegible]	23.50	[illegible]	-
Turn-On Delay	sec	0.1003	0.0968	0.0310	0.1001	0.0962	-
Turn-Off Delay	sec	[illegible]	0.0730	0.0220	0.0725	[illegible]	-
Deadband (half-width)	deg	0.7831	0.7944	1.405	0.7831	0.7944	-
Gain Ratio	sec	0.4866	0.4823	0.4331	0.4866	0.4331	-
Hysteresis	% deadband	1.81	0.30	1.00	1.81	0.80	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	9.115	10.81	0.4215	9.160	9.35	-
Period	sec	1.836	1.654	[illegible]	1.820	1.700	-
Pulse Width	sec	0.0866	0.0894	0.0463	0.0808	0.0831	-
Limit Cycle Velocity	deg/sec	0.9687	1.051	0.4273	0.9721	1.037	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	51.30	51.05	15.45	-	-	-
Acceleration	deg/sec^2	16.76	16.67	60.97	-	-	-
Turn-On Delay	sec	0.0543	0.0608	0.0467	-	-	-
Turn-Off Delay	sec	0.0503	0.0534	0.0330	-	-	-
Deadband (half-width)	deg	0.7831	0.7944	1.405	-	-	-
Gain Ratio	sec	0.4866	0.4823	0.4331	-	-	-
Hysteresis	% deadband	1.81	0.30	1.00	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.160	2.329	2.275	-	-	-
Period	sec	5.130	4.990	3.113	-	-	-
Pulse Width	sec	0.0554	0.0581	0.0355	-	-	-
Limit Cycle Velocity	deg/sec	0.4640	0.4844	1.023	-	-	-

S-146C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	526.5	519.5	45.13	534.0	-	-
Acceleration	deg/sec^2	24.15	23.83	36.88	24.50	-	-
Turn-On Delay	sec	0.0985	0.0963	0.0386	0.0985	-	-
Turn-Off Delay	sec	0.0705	0.0698	0.0237	0.1500	-	-
Deadband (half-width)	deg	0.8011	0.7894	1.4156	0.8011	-	-
Gain Ratio	sec	0.4850	0.4800	0.4275	0.4850	-	-
Hysteresis	% deadband	1.40	0.80	1.77	1.40	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	8.375	7.968	0.5289	8.285	-	-
Period	sec	1.918	1.981	10.051	2.011	-	-
Pulse Width	sec	0.0803	0.0789	0.0266	0.0828	-	-
Limit Cycle Velocity	deg/sec	0.9700	0.9403	0.4901	1.0135	-	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.25	50.85	14.39	-	-	-
Acceleration	deg/sec^2	17.45	17.63	70.00	-	-	-
Turn-On Delay	sec	0.0705	0.0658	0.0332	-	-	-
Turn-Off Delay	sec	0.0600	0.0561	0.0288	-	-	-
Deadband (half-width)	deg	0.8011	0.7894	1.4156	-	-	-
Gain Ratio	sec	0.4850	0.4800	0.4275	-	-	-
Hysteresis	% deadband	1.40	0.80	1.77	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.335	2.846	1.657	-	-	-
Period	sec	3.992	4.309	3.726	-	-	-
Pulse Width	sec	0.0666	0.0613	0.0309	-	-	-
Limit Cycle Velocity	deg/sec	0.5808	0.5404	1.0803	-	-	-

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-147C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	502.	506.	43.4	-	-	-
Acceleration	deg/sec^2	22.63	22.81	34.79	-	-	-
Turn-On Delay	sec	0.097	0.108	0.026	-	-	-
Turn-Off Delay	sec	0.069	0.074	0.020	-	-	-
Deadband (half-width)	deg	0.795	0.794	1.46	-	-	-
Gain Ratio	sec	0.502	0.493	0.435	-	-	-
Hysteresis	% deadband	0.80	0.79	0.99	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	7.35	8.70	0.313	-	-	-
Period	sec	2.13	1.93	13.89	-	-	-
Pulse Width	sec	0.078	0.084	0.022	-	-	-
Limit Cycle Velocity	deg/sec	1.59	0.96	0.38	-	-	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.1	50.1	14.0	-	-	-
Acceleration	deg/sec^2	15.84	16.16	59.80	-	-	-
Turn-On Delay	sec	0.076	0.069	0.034	-	-	-
Turn-Off Delay	sec	0.063	0.061	0.032	-	-	-
Deadband (half-width)	deg	0.795	0.794	1.465	-	-	-
Gain Ratio	sec	0.502	0.493	0.435	-	-	-
Hysteresis	% deadband	0.80	0.79	0.99	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.27	3.05	1.58	-	-	-
Period	sec	4.23	4.36	4.27	-	-	-
Pulse Width	sec	0.069	0.066	0.034	-	-	-
Limit Cycle Velocity	deg/sec	0.55	0.54	1.01	-	-	-

S-148C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	526.0	515.0	44.40	[illegible]	563.0	--
Acceleration	deg/sec^2	23.24	23.19	35.55	[illegible]	[illegible]	--
Turn-On Delay	sec	0.125	0.104	[illegible]	[illegible]	[illegible]	--
Turn-Off Delay	sec	[illegible]	[illegible]	0.014	[illegible]	[illegible]	--
Deadband (half-width)	deg	[illegible]	0.800	1.425	[illegible]	0.792	--
Gain Ratio	sec	0.471	0.475	0.438	[illegible]	[illegible]	--
Hysteresis	% deadband	0.795	0.775	0.504	0.795	[illegible]	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	7.349	7.579	0.262	[illegible]	7.289	--
Period	sec	2.167	2.125	14.72	[illegible]	[illegible]	--
Pulse Width	sec	0.080	0.080	0.020	[illegible]	[illegible]	--
Limit Cycle Velocity	deg/sec	0.925	0.925	2.350	1.15	1.35	--

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	50.55	14.19	--	--	--
Acceleration	deg/sec^2	16.19	15.64	62.37	--	--	--
Turn-On Delay	sec	0.065	0.064	0.035	--	--	--
Turn-Off Delay	sec	0.061	0.068	0.035	--	--	--
Deadband (half-width)	deg	0.803	0.802	1.425	--	--	--
Gain Ratio	sec	0.471	0.495	0.438	--	--	--
Hysteresis	% deadband	0.795	0.795	0.558	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.024	3.732	2.151	--	--	--
Period	sec	4.433	3.993	3.448	--	--	--
Pulse Width	sec	0.067	0.074	0.037	--	--	--
Limit Cycle Velocity	deg/sec	0.548	0.541	1.151	--	--	--

S-149C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	543.5	516.5	44.9	561.0	--	--
Acceleration	deg/sec^2	25.50	25.95	37.09	26.3	--	--
Turn-On Delay	sec	0.102	0.077	0.029	0.102	--	--
Turn-Off Delay	sec	0.070	0.074	0.021	0.058	--	--
Deadband (half-width)	deg	0.793	0.796	1.439	0.793	--	--
Gain Ratio	sec	0.512	0.491	0.443	0.512	--	--
Hysteresis	% deadband	1.165	0.975	1.165	1.165	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	9.743	10.76	0.380	6.15	--	--
Period	sec	1.621	1.516	11.99	2.13	--	--
Pulse Width	sec	0.079	0.081	0.023	0.065	--	--
Limit Cycle Velocity	deg/sec	1.007	1.058	0.423	0.860	--	--

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.7	51.1	14.6	--	--	--
Acceleration	deg/sec^2	17.11	17.25	69.82	--	--	--
Turn-On Delay	sec	0.063	0.063	0.036	--	--	--
Turn-Off Delay	sec	0.059	0.057	0.027	--	--	--
Deadband (half-width)	deg	0.793	0.796	1.439	--	--	--
Gain Ratio	sec	0.512	0.491	0.443	--	--	--
Hysteresis	% deadband	1.165	0.975	1.165	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.138	2.861	1.381	--	--	--
Period	sec	4.098	4.348	4.163	--	--	--
Pulse Width	sec	0.064	0.062	0.028	--	--	--
Limit Cycle Velocity	deg/sec	0.550	0.536	1.004	--	--	--

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-150C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	527.5	520.5	44.48	577.0	534.0	--
Acceleration	deg/sec^2	23.96	23.65	35.71	26.30	24.20	--
Turn-On Delay	sec	0.076	0.073	0.024	0.076	0.073	--
Turn-Off Delay	sec	0.042	0.044	0.019	0.059	0.062	--
Deadband (half-width)	deg	0.816	0.793	1.438	0.816	0.793	--
Gain Ratio	sec	0.486	0.500	0.443	0.486	0.500	--
Hysteresis	% deadband	1.400	0.995	2.008	1.400	0.995	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.169	2.407	0.311	5.930	5.953	--
Period	sec	4.298	3.982	13.592	2.061	2.283	--
Pulse Width	sec	0.046	0.049	0.021	0.067	0.068	--
Limit Cycle Velocity	deg/sec	0.553	0.567	0.378	0.859	0.822	--

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.70	48.95	14.05	--	--	--
Acceleration	deg/sec^2	15.70	15.16	58.52	--	--	--
Turn-On Delay	sec	0.069	0.063	0.059	--	--	--
Turn-Off Delay	sec	0.058	0.055	0.056	--	--	--
Deadband (half-width)	deg	0.816	0.793	1.438	--	--	--
Gain Ratio	sec	0.486	0.500	0.443	--	--	--
Hysteresis	% deadband	1.40	0.995	2.008	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.668	2.301	6.926	--	--	--
Period	sec	4.867	5.272	1.779	--	--	--
Pulse Width	sec	0.065	0.061	0.062	--	--	--
Limit Cycle Velocity	deg/sec	0.510	0.460	1.803	--	--	--

S-151C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	530.0	531.0	45.65			
Acceleration	deg/sec^2	24.17	24.21	36.69			
Turn-On Delay	sec	0.0707	0.0735	0.0231	NOT EVALUATED		
Turn-Off Delay	sec	0.0433	0.0370	0.0198			
Deadband (half-width)	deg	0.798	0.791	1.485			
Gain Ratio	sec	0.503	0.489	0.439			
Hysteresis	% deadband	0.595	0.990	0.998			

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.379	1.699	0.318			
Period	sec	3.966	4.812	13.499	NOT EVALUATED		
Pulse Width	sec	0.0472	0.0409	0.091			
Limit Cycle Velocity	deg/sec	0.570	0.495	0.393			

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.42	50.05	14.65	--	--	--
Acceleration	deg/sec^2	15.33	15.53	60.60	--	--	--
Turn-On Delay	sec	0.0649	0.0634	0.0366	--	--	--
Turn-Off Delay	sec	0.0552	0.0504	0.0305	--	--	--
Deadband (half-width)	deg	0.798	0.791	1.485	--	--	--
Gain Ratio	sec	0.503	0.439	0.439	--	--	--
Hysteresis	% deadband	0.595	0.990	0.998	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.255	2.662	1.447	--	--	--
Period	sec	5.316	4.801	4.490	--	--	--
Pulse Width	sec	0.060	0.064	0.032	--	--	--
Limit Cycle Velocity	deg/sec	0.463	0.496	0.934	--	--	--

S-152C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	524	499.5	41.863	524	499.5	--
Acceleration	deg/sec^2	23.98	22.87	33.68	23.98	22.87	--
Turn-On Delay	sec	0.0781	0.0678	0.0273	0.0781	0.0678	--
Turn-Off Delay	sec	0.0431	0.0458	0.0186	0.063*	0.067*	--
Deadband (half-width)	deg	0.801	0.7765	1.3921	0.801	0.7765	--
Gain Ratio	sec	0.4756	0.5085	0.4333	0.4756	0.5085	--
Hysteresis	% deadband	0.800	1.187	1.945	0.800	1.187	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.3343	2.6684	0.3018	5.8246	7.1368	--
Period	sec	4.0951	3.7577	14.0323	2.3017	2.479	--
Pulse Width	sec	0.0478	0.0501	0.02118	0.0656	0.07475	--
Limit Cycle Velocity	deg/sec	0.5731	0.5733	0.3566	0.862	0.938	--

* Effective time delay including effects of structural coupling.

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.0	49.7	14.35	--	--	--
Acceleration	deg/sec^2	14.32	14.23	61.65	--	--	--
Turn-On Delay	sec	0.0641	0.0944	0.0407	--	--	--
Turn-Off Delay	sec	0.0591	0.0557	0.0342	--	--	--
Deadband (half-width)	deg	0.801	0.7765	1.3921	--	--	--
Gain Ratio	sec	0.4756	0.5085	0.4333	--	--	--
Hysteresis	% deadband	0.800	1.187	1.945	--	--	--

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.4013	2.3555	2.1958	--	--	--
Period	sec	5.3929	5.3723	3.3761	--	--	--
Pulse Width	sec	0.06475	0.06327	0.03701	--	--	--
Limit Cycle Velocity	deg/sec	0.4636	0.4932	1.1425	--	--	--

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-153C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	530.0	505.5	43.91	530.5	546.0	-
Acceleration	deg/sec^2	23.5	22.4	34.9	23.5	24.2	-
Turn-On Delay	sec	0.103	0.102	0.026	0.1033	0.1023	-
Turn-Off Delay	sec	0.063	0.068	0.020	0.057	0.068	-
Deadband (half-width)	deg	0.802	0.802	1.432	0.802	0.802	-
Gain Ratio	sec	0.5	0.5	0.45	2.0	2.0	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	6.13	6.82	0.312	4.71	7.72	-
Period	sec	2.35	2.27	13.69	2.75	2.00	-
Pulse Width	sec	0.072	0.077	0.021	0.065	0.077	-
Limit Cycle Velocity	deg/sec	0.946	0.866	0.273	0.762	0.934	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	48.35	50.2	14.12	-	-	-
Acceleration	deg/sec^2	14.7	15.3	58.7	-	-	-
Turn-On Delay	sec	0.065	0.064	0.040	-	-	-
Turn-Off Delay	sec	0.054	0.055	0.029	-	-	-
Deadband (half-width)	deg	0.802	0.802	1.432	-	-	-
Gain Ratio	sec	0.5	0.5	0.45	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.05	2.27	1.28	-	-	-
Period	sec	5.76	5.31	4.78	-	-	-
Pulse Width	sec	0.060	0.060	0.031	-	-	-
Limit Cycle Velocity	deg/sec	0.435	0.462	0.899	-	-	-

S-154C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	512.500	52[illegible]	43.537	-	-	-
Acceleration	deg/sec^2	23.583	24.230	35.7[illegible]	-	-	-
Turn-On Delay	sec	0.104	0.083	0.073	-	-	-
Turn-Off Delay	sec	0.062	0.059	0.032	-	-	-
Deadband (half-width)	deg	0.782	0.770	1.393	-	-	-
Gain Ratio	sec	0.479	0.480	0.427	-	-	-
Hysteresis	% deadband	1.605	1.005	1.515	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	6.315	8.427	0.427	-	-	-
Period	sec	2.280	1.857	11.321	-	-	-
Pulse Width	sec	0.072	0.078	0.024	-	-	-
Limit Cycle Velocity	deg/sec	0.860	0.948	0.433	-	-	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.550	49.100	14.938	-	-	-
Acceleration	deg/sec^2	14.710	14.288	73.927	-	-	-
Turn-On Delay	sec	0.065	0.065	0.320	-	-	-
Turn-Off Delay	sec	0.062	0.059	0.030	-	-	-
Deadband (half-width)	deg	0.782	0.770	1.393	-	-	-
Gain Ratio	sec	0.479	0.480	0.427	-	-	-
Hysteresis	% deadband	1.605	1.005	1.515	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.003	2.493	1.984	-	-	-
Period	sec	4.616	6.164	3.213	-	-	-
Pulse Width	sec	0.069	0.064	0.032	-	-	-
Limit Cycle Velocity	deg/sec	0.510	0.460	1.178	-	-	-

S-155C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	518	513.5	41.662	518	522.22	-
Acceleration	deg/sec^2	23.591	23.386	33.47	23.591	23.786	-
Turn-On Delay	sec	0.08792	0.10735	0.02163	0.08792	0.10735	-
Turn-Off Delay	sec	0.07345	0.06082	0.01806	0.07215	0.072	-
Deadband (half-width)	deg	0.802	0.8128	1.4102	0.802	0.8128	-
Gain Ratio	sec	0.5076	0.49006	0.4462	0.5076	0.49006	-
Hysteresis	% deadband	2.71	2.75	3.995	2.71	2.75	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	9.4644	5.6612	0.3366	9.0171	8.88	-
Period	sec	1.7576	2.5159	13.350	1.8126	1.89	-
Pulse Width	sec	0.08317	0.07122	0.02247	0.08172	0.084	-
Limit Cycle Velocity	deg/sec	0.98134	0.8327[illegible]	0.3760	0.964	0.999	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.55	48.95	15.013	-	-	-
Acceleration	deg/sec^2	15.98	15.79	65.886	-	-	-
Turn-On Delay	sec	0.0618	0.0702	0.03562	-	-	-
Turn-Off Delay	sec	0.06065	0.06155	0.0299	-	-	-
Deadband (half-width)	deg	0.802	0.8128	1.4102	-	-	-
Gain Ratio	sec	0.5076	0.49006	0.4462	-	-	-
Hysteresis	% deadband	2.71	2.75	3.995	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	3.1830	3.2211	1.8616	-	-	-
Period	sec	4.2661	4.3451	3.573	-	-	-
Pulse Width	sec	0.0679	0.0780	0.0333	-	-	-
Limit Cycle Velocity	deg/sec	0.5425	0.5525	1.0956	-	-	-

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR.

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-156C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	500	500	42.8	430	475	-
Acceleration	deg/sec^2	23.1	23.1	35.13	20	22	-
Turn-On Delay	sec	0.064	0.104	0.027	0.084	0.104	-
Turn-Off Delay	sec	0.064	0.083	0.000	0.083	0.080	-
Deadband (half-width)	deg	0.309	0.314	1.373	0.307	0.314	-
Gain Ratio	sec	0.485	0.498	0.445	0.485	0.498	-
Hysteresis	% deadband	0.8	0.6	1.0	0.8	0.6	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	5.74	11.75	0.35	8.75	9.73	-
Period	sec	2.48	1.60	12.67	[illegible]	[illegible]	-
Pulse Width	sec	0.071	0.104	0.022	0.072	[illegible]	-
Limit Cycle Velocity	deg/sec	[illegible]	1.09	0.33	0.92	1.03	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.4	48.6	14.4	-	-	-
Acceleration	deg/sec^2	16.74	16.46	70.1	-	-	-
Turn-On Delay	sec	0.071	0.061	0.029	-	-	-
Turn-Off Delay	sec	0.056	0.057	0.029	-	-	-
Deadband (half-width)	deg	0.309	0.314	1.373	-	-	-
Gain Ratio	sec	0.485	0.498	0.445	-	-	-
Hysteresis	% deadband	0.8	0.6	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.60	2.57	1.56	-	-	-
Period	sec	4.74	4.80	3.71	-	-	-
Pulse Width	sec	0.062	0.062	0.029	-	-	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	-	-	-

S-157C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	517	520	45.0	478	480	-
Acceleration	deg/sec^2	24.30	24.77	37.36	22.0	23.0	-
Turn-On Delay	sec	0.115	0.100	0.036	0.115	0.100	-
Turn-Off Delay	sec	0.0798	0.064	0.019	0.080	0.065	-
Deadband (half-width)	deg	0.798	0.775	1.590	0.798	0.775	-
Gain Ratio	sec	0.585	0.508	0.448	0.585	0.508	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	9.58	7.51	0.308	10.71	8.63	-
Period	sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Pulse Width	sec	0.083	0.076	0.080	0.098	0.276	-
Limit Cycle Velocity	deg/sec	0.79	0.91	0.77	1.01	0.86	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.2	49.7	15.4	-	-	-
Acceleration	deg/sec^2	16.63	16.80	75.71	-	-	-
Turn-On Delay	sec	0.064	0.064	0.033	-	-	-
Turn-Off Delay	sec	0.057	0.058	0.029	-	-	-
Deadband (half-width)	deg	0.798	0.775	1.590	-	-	-
Gain Ratio	sec	0.585	0.508	0.448	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.72	1.06	[illegible]	-	-	-
Period	sec	4.52	4.18	3.26	-	-	-
Pulse Width	sec	0.062	0.064	0.030	-	-	-
Limit Cycle Velocity	deg/sec	0.51	0.53	1.14			

S-158C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	527.5	519.5	46.45	517.2	-	-
Acceleration	deg/sec^2	25.5	23.2	35.1	25.0	-	-
Turn-On Delay	sec	*0.096	*0.103	0.036	*0.105	-	-
Turn-Off Delay	sec	*0.071	*0.075	0.030	*0.071	-	-
Deadband (half-width)	deg	*0.619	[illegible]	1.426	*0.619	-	-
Gain Ratio	sec	0.478	0.510	0.445	0.478	-	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	7.50	5.33	0.36	5.64	-	-
Period	sec	2.13	1.30	13.0	1.89	-	-
Pulse Width	sec	0.080	0.085	0.048	0.088	-	-
Limit Cycle Velocity	deg/sec	0.937	0.983	0.390	1.08	-	-

* Body Bending Filter switched in.

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.6	49.7	14.4	-	-	-
Acceleration	deg/sec^2	15.8	15.6	61.0	-	-	-
Turn-On Delay	sec	*0.071	*0.068	0.038	-	-	-
Turn-Off Delay	sec	*0.071	*0.068	0.030	-	-	-
Deadband (half-width)	deg	*0.619	[illegible]	1.486	-	-	-
Gain Ratio	sec	0.478	0.510	0.445	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	2.09	[illegible]	-	-	-
Period	sec	[illegible]	[illegible]	4.37	-	-	-
Pulse Width	sec	0.078	0.167	0.031	-	-	-
Limit Cycle Velocity	deg/sec	0.619	[illegible]	0.998	-	-	-

* Body Bending Filter switched in.

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

SECOND STAGE

THIRD STAGE

S-159C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	589.5	538.5	44.46	575.6	-	-
Acceleration	deg/sec^2	23.59	23.45	35.63	25.5	-	-
Turn-On Delay	sec	0.069*	0.076*	0.041	0.074	-	-
Turn-OFF Delay	sec	0.039*	0.051*	0.018	0.038	-	-
Deadband (half-width)	deg	1.399*	1.417*	1.438	1.399	-	-
Gain Ratio	sec	0.486	0.494	0.438	0.486	-	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	0.908	1.62	0.285	2.98	-	-
Period	sec	9.35	6.99	14.38	5.10	-	-
Pulse Width	sec	0.042	0.056	0.080	0.064	-	-
Limit Cycle Velocity	deg/sec	0.497	0.663	0.361	0.881	-	-

* Body bending filter switched out.

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.9	49.6	14.98	-	-	-
Acceleration	deg/sec^2	14.76	14.73	64.73	-	-	-
Turn-On Delay	sec	0.097	0.090	0.066	-	-	-
Turn-OFF Delay	sec	0.083	0.076	0.034	-	-	-
Deadband (half-width)	deg	1.405	1.384	1.438	-	-	-
Gain Ratio	sec	0.486	0.494	0.438	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.98	1.64	2.36	-	-	-
Period	sec	6.50	10.58	3.43	-	-	-
Pulse Width	sec	0.096	0.087	0.035	-	-	-
Limit Cycle Velocity	deg/sec	0.708	0.640	1.14	-	-	-

S-160C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	529	507	43.5	-	498	-
Acceleration	deg/sec^2	24.1	23.2	34.7	-	22.3	-
Turn-On Delay	sec	0.119	0.118	0.031	-	0.118	-
Turn-OFF Delay	sec	0.087	0.086	0.0196	-	0.097	-
Deadband (half-width)	deg	0.756	0.798	1.424	-	0.798	-
Gain Ratio	sec	0.510	0.508	0.458	-	0.508	-
Hysteresis	% deadband	1.0	1.0	1.0	-	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	16.35	14.26	0.326	-	16.20	-
Period	sec	1.83	1.89	13.79	-	1.83	-
Pulse Width	sec	0.101	0.099	0.081	-	0.112	-
Limit Cycle Velocity	deg/sec	1.21	1.15	0.368	-	1.23	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.8	49.9	14.8	-	-	-
Acceleration	deg/sec^2	15.9	16.0	52.5	-	-	-
Turn-On Delay	sec	0.093	0.089	0.038	-	-	-
Turn-OFF Delay	sec	0.075	0.077	0.038	-	-	-
Deadband (half-width)	deg	0.756	0.798	1.424	-	-	-
Gain Ratio	sec	0.510	0.508	0.458	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	4.30	4.96	1.61	-	-	-
Period	sec	1.18	1.40	3.75	-	-	-
Pulse Width	sec	0.084	0.086	0.034	-	-	-
Limit Cycle Velocity	deg/sec	0.672	0.688	1.36	-	-	-

S-161C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT VALUES			FLIGHT TEST DATA **		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	512.5	523.0	44.0	-	534.0	-
Acceleration	deg/sec^2	23.1	23.5	35.2	-	24.0	-
Turn-On Delay	sec	0.079*	0.077*	0.033	-	0.077*	-
Turn-Off Delay	sec	0.042*	0.042*	0.021	-	0.070*	-
Deadband (half-width)	deg	0.781*	0.772*	1.491	-	0.772*	-
Gain Ratio	sec	0.491	0.487	0.438	-	0.487	-
Hysteresis	% deadband	1.00	1.19	1.28	-	1.19	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.19	1.29	0.139	-	3.41	-
Period	sec	4.24	4.39	13.40	-	4.85	-
Pulse Width	sec	0.047	0.047	0.083	-	0.075	-
Limit Cycle Velocity	deg/sec	0.539	0.549	0.398	-	0.352	-

* Body bending filter switched out.
** Flight Test control system settings are calculated values that will give Flight Test limit cycle parameters measured from Flight Test records.

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	40.2	40.5	15.1	-	-	-
Acceleration	deg/sec^2	16.1	15.9	54.2	-	-	-
Turn-On Delay	sec	0.089	0.093	0.039	-	-	-
Turn-OFF Delay	sec	0.068	0.074	0.033	-	-	-
Deadband (half-width)	deg	0.802	0.793	1.453	-	-	-
Gain Ratio	sec	0.491	0.487	0.438	-	-	-
Hysteresis	% deadband	1.30	1.19	1.28	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	4.25	4.32	1.30	-	-	-
Period	sec	1.76	1.75	1.54	-	-	-
Pulse Width	sec	0.076	0.084	0.035	-	-	-
Limit Cycle Velocity	deg/sec	0.613	0.668	1.15	-	-	-

* Flight Test control system settings are calculated values that will give Flight Test limit cycle parameters measured from flight test records.

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-162C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	481	510	43.6	536.6	564.2	-
Acceleration	deg/sec^2	22.6	23.5	35.6	26.7	26.0	-
Turn-On Delay	sec	0.129**	0.129*	0.089	0.129	0.129	-
Turn-Off Delay	sec	0.086**	0.089*	0.022	0.096	0.091	-
Deadband (half-width)	deg	0.82	0.808	1.43	0.82	0.808	-
Gain Ratio	sec	0.468	0.474	0.432	0.468	0.474	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	11.4	13.3	0.105	19.2	19.2	-
Period	sec	1.79	1.52	12.2	1.19	1.12	-
Pulse Width	sec	0.100	0.101	0.083	0.114	0.108	-
Limit Cycle Velocity	deg/sec	1.13	1.19	0.417	1.41	1.40	-

* Body bending filter switched in.

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	50.15	50.5	15.1	-	-	-
Acceleration	deg/sec^2	17.4	17.4	75.1	-	-	-
Turn-On Delay	sec	0.084	0.086	0.040	-	-	-
Turn-Off Delay	sec	0.080	0.074	0.032	-	-	-
Deadband (half-width)	deg	0.82	0.808	1.43	-	-	-
Gain Ratio	sec	0.468	0.474	0.432	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	5.24	5.45	2.34	-	-	-
Period	sec	2.68	3.06	2.93	-	-	-
Pulse Width	sec	0.090	0.083	0.034	-	-	-
Limit Cycle Velocity	deg/sec	0.774	0.722	1.29	-	-	-

S-164C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	512.5	[illegible]	45.[illegible]	570	504	-
Acceleration	deg/sec^2	23.[illegible]	24.2	49.[illegible]	27.5	27.5	-
Turn-On Delay	sec	0.072*	0.064*	0.025	0.072	0.064	-
Turn-Off Delay	sec	0.067*	0.064*	0.024	0.067*	0.067	-
Deadband (half-width)	deg	[illegible]*	[illegible]*	[illegible]	[illegible]	[illegible]	-
Gain Ratio	sec	0.482	0.481	0.427	0.482	0.481	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
Period	sec	[illegible]	[illegible]	[illegible]	4.42	4.15	-
Pulse Width	sec	0.242	0.264	0.026	[illegible]	0.074	-
Limit Cycle Velocity	deg/sec	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-

* Body bending filter switched out

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	[illegible]	46.6	14.6	-	-	15.9
Acceleration	deg/sec^2	[illegible]	[illegible]	70.0	-	-	76.3
Turn-On Delay	sec	0.081	0.080	0.034	-	-	0.034
Turn-Off Delay	sec	0.074	0.073	0.030	-	-	0.030
Deadband (half-width)	deg	[illegible]	1.40	1.44	-	-	1.44
Gain Ratio	sec	0.482	0.481	0.427	-	-	0.427
Hysteresis	% deadband	1.0	1.0	1.0	-	-	1.0

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.01	[illegible]	[illegible]	-	-	2.49
Period	sec	4.40	4.03	3.66	-	-	2.52
Pulse Width	sec	0.084	0.083	0.032	-	-	0.036
Limit Cycle Velocity	deg/sec	0.558	0.535	1.113	-	-	1.435

S-165C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT VALUE			FLIGHT TEST DATA*		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	585.5	515.0	46.0	-	517.0	-
Acceleration	deg/sec^2	26.3	23.6	35.6	-	23.7	-
Turn-On Delay	sec	0.133	0.125	0.030	-	0.125	-
Turn-Off Delay	sec	0.098	0.094	0.083	-	0.110	-
Deadband (half-width)	deg	0.808	0.774	1.417	-	0.774	-
Gain Ratio	sec	0.511	0.478	0.411	-	0.478	-
Hysteresis	% deadband	2.15	1.75	2.12	-	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	28.2	18.5	0.43	-	27.8	-
Period	sec	1.04	1.20	11.36	-	3.88	-
Pulse Width	sec	0.115	0.111	0.085	-	0.18	-
Limit Cycle Velocity	deg/sec	1.39	1.31	0.68	-	1.56	-

* Flight Test control system settings are calculated values that will give Flight Test limit cycle parameters measured from Flight Test records.

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT VALUE			FLIGHT TEST DATA*		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	51.6	51.6	15.2	-	-	-
Acceleration	deg/sec^2	16.7	16.7	69.1	-	-	-
Turn-On Delay	sec	0.079	0.080	0.038	-	-	-
Turn-Off Delay	sec	0.076	0.075	0.031	-	-	-
Deadband (half-width)	deg	0.808	0.774	1.417	-	-	-
Gain Ratio	sec	0.511	0.478	0.441	-	-	-
Hysteresis	% deadband	2.15	1.75	2.12	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	5.5	5.5	1.9	-	-	-
Period	sec	3.36	3.04	3.48	-	-	-
Pulse Width	sec	0.086	0.084	0.038	-	-	-
Limit Cycle Velocity	deg/sec	0.70	0.70	1.18	-	-	-

* Flight Test control system settings are calculated values that will give Flight Test limit cycle parameters measured from Flight Test records.

TABLE CCVIII Continued - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS

S-167C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS		PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
			PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	*	518.5	505.4	41.3	506.5	[illegible]	.
		**	518.5	505.5	41.8	540.1	511.1	.
Acceleration	deg/sec^2	*	23.12	22.54	13.41	22.4	22.4	.
		**	23.12	22.54	13.23	24.1	22.9	.
Turn-On Delay	sec	*	0.125	0.129	0.130	0.125	.129	.
		**	0.279	0.281	0.130	0.279	0.281	.
Turn-Off Delay	sec	*	0.291	0.288	0.320	0.248	.401	.
		**	0.245	0.242	0.320	0.285	0.272	.
Deadband (half-width)	deg	*	0.794	0.804	1.305	0.794	0.804	.
		**	0.771	0.751	1.305	0.771	0.751	.
Gain Ratio	sec	*	2.053	2.080	2.242	2.053	2.080	.
		**	2.251	2.280	2.242	2.251	2.280	.
Hysteresis	% deadband	*	1.96	1.54	1.36	1.96	1.54	.
		**	1.26	1.54	1.38	1.36	1.54	.

LIMIT CYCLE PARAMETERS

Duty Cycle	%	*	18.27	13.41	3.36	18.35	[illegible]	.
		**	2.70	2.47	.36	[illegible]	[illegible]	.
Period	sec	*	1.32	4.49	11.30	1.26	1.13	.
		**	1.73	4.36	11.30	2.36	1.21	.
Pulse Width	sec	*	0.107	0.106	0.382	0.114	[illegible]	.
		**	0.051	0.267	0.328	0.073	[illegible]	.
Limit Cycle Velocity	deg/sec	*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.
		**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.

* Filter IN
** Filter OUT

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	48.75	50.45	15.19	.	.	.
Acceleration	deg/sec^2	15.38	15.06	67.40	.	.	.
Turn-On Delay	sec	0.125	0.129	0.029	.	.	.
Turn-Off Delay	sec	0.091	0.088	0.020	.	.	.
Deadband	deg	0.794	0.804	1.305	.	.	.
Gain Ratio	sec	2.053	2.080	2.242	.	.	.
Hysteresis	% deadband	1.96	1.54	1.36	.	.	.

LIMIT CYCLE PARAMETERS

Duty Cycle	%	5.77	7.95	0.72	.	.	.
Period	sec	2.59	2.63	5.96	.	.	.
Pulse Width	sec	0.108	0.104	0.081	.	.	.
Limit Cycle Velocity	deg/sec	0.830	0.890	0.720	.	.	.

S-168C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	533.0	537.0	40.6	533.0	537.0	.
Acceleration	deg/sec^2	23.43	23.61	[illegible]	23.43	23.61	.
Turn-On Delay	sec	0.072*	0.079*	0.026	0.072*	0.079*	.
Turn-Off Delay	sec	0.263*	0.268*	0.282	0.262*	0.271*	.
Deadband (half-width)	deg	1.39*	1.35*	1.42	1.39*	1.35*	.
Gain Ratio	sec	0.48	0.47	0.44	0.48	0.47	
Hysteresis	% deadband	2.33	1.58	1.26	2.33	1.50	.

LIMIT CYCLE PARAMETERS

Duty Cycle	%	4.25	1.06	[illegible]	2.67	=	
Period	sec	7.44	6.88	44.32	5.25	4.49	.
Pulse Width	sec	0.095	0.099	0.383	0.270	0.380	
Limit Cycle Velocity	deg/sec	0.505	0.646	0.480	0.38	0.35	.

* Body Bending Filter Switched Out

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.6	50.9	15.2	.	.	.
Acceleration	deg/sec^2	14.98	15.36	67.48	.	.	.
Turn-On Delay	sec	0.086	0.088	0.031	.	.	.
Turn-Off Delay	sec	0.078	0.076	0.024	.	.	.
Deadband (half-width)	deg	1.405	1.390	1.460	.	.	.
Gain Ratio	sec	0.48	0.47	2.265	.	.	.
Hysteresis	% deadband	2.13	1.98	1.88	.	.	.

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.49	2.57	1.08	.	.	.
Period	sec	4.85	6.05	5.21	.	.	.
Pulse Width	sec	0.098	0.098	0.085	.	.	.
Limit Cycle Velocity	deg/sec	0.698	0.677	0.806	.	.	.

S-169C

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	524	530	47.1	530	535	-
Acceleration	deg/sec^2	23.51	23.78	16.46	23.8	24.0	-
Turn-On Delay	sec	0.116	0.119	0.034	0.116	0.119	-
Turn-Off Delay	sec	0.057	0.084	0.022	0.084	0.058	-
Deadband (half-width)	deg	0.802	0.779	1.402	0.802	0.779	-
Gain Ratio	sec	0.520	0.510	0.461	0.520	0.510	-
Hysteresis	% deadband	0.79	0.58	1.17	0.78	0.59	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	15.41	15.46	0.43	11.26	16.87	-
Period	sec	1.39	1.28	11.21	1.41	1.20	-
Pulse Width	sec	0.099	0.099	0.024	0.294	0.101	-
Limit Cycle Velocity	deg/sec	1.17	1.18	0.436	1.11	1.22	-

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	43.2	[illegible]	[illegible]	-	-	-
Acceleration	deg/sec^2	15.45	15.41	61.43	-	-	-
Turn-On Delay	sec	0.081	0.084	0.035	-	-	-
Turn-Off Delay	sec	0.070	0.072	0.027	-	-	-
Deadband (half-width)	deg	[illegible]	0.779	[illegible]	-	-	-
Gain Ratio	sec	[illegible]	0.510	0.461	-	-	-
Hysteresis	% deadband	[illegible]	0.58	1.17	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	4.27	4.50	1.27	-	-	-
Period	sec	3.61	3.54	6.41	-	-	-
Pulse Width	sec	[illegible]	0.079	0.039	-	-	-
Limit Cycle Velocity	deg/sec	[illegible]	0.61	0.91	-	-	-

TABLE CCVIII Concluded - SCOUT CONTROL SYSTEM AND LIMIT CYCLE PARAMETERS.

S-171C

SECOND STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	525	528	47.6	579	579	-
Acceleration	deg/sec^2	22.63	22.76	36.67	25.0	25.0	-
Turn-On Delay	sec	0.0718*	0.0780*	0.0310	0.0718	0.0780	-
Turn-Off Delay	sec	0.0484*	0.0501*	0.0217	0.070	0.0550	-
Deadband (half-width)	deg	1.418*	1.409*	1.420	1.418	1.409	-
Gain Ratio	sec	0.504	0.508	0.456	0.504	0.508	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	1.394	1.542	0.403	2.712	2.168	-
Period	sec	7.708	7.251	11.595	5.110	5.833	-
Pulse Width	sec	0.054	0.056	0.083	0.069	0.063	-
Limit Cycle Velocity	deg/sec	0.608	0.636	0.429	0.866	0.842	-

* Body Bending Filter Switched Out.

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	49.8	49.2	14.6	43.1	42.5	-
Acceleration	deg/sec^2	14.46	14.28	64.15	12.5	12.33	-
Turn-On Delay	sec	0.0802	0.0827	0.0373	-	-	-
Turn-Off Delay	sec	0.0693	0.0715	0.0304	-	-	-
Deadband (half-width)	deg	1.418	1.409	1.420	-	-	-
Gain Ratio	sec	0.504	0.508	0.456	-	-	-
Hysteresis	% deadband	1.0	1.0	1.0	-	-	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	1.834	1.944	1.664	-	-	-
Period	sec	8.511	8.273	3.879	-	-	-
Pulse Width	sec	0.078	0.080	0.032	-	-	-
Limit Cycle Velocity	deg/sec	0.564	0.574	1.035	-	-	-

S-172C

SECOND STAGE

FILTER IN

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	515	513.5	44.4	519	487	
Acceleration	deg/sec^2	22.61	22.54	34.18	22.8	21.4	-
Turn-On Delay	sec	0.1239	0.1214	0.0272	0.1239	0.1214	-
Turn-Off Delay	sec	0.0934	0.0929	0.0205	0.092	0.910	-
Deadband (half-width)	deg	0.793	0.780	1.419	0.791	0.789	-
Gain Ratio	sec	0.508	0.510	0.47	0.508	0.510	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	17.24	17.11	0.33	16.81	14.57	-
Period	sec	1.26	1.26	13.33	1.28	1.45	-
Pulse Width	sec	0.109	0.108	0.022	0.108	0.105	-
Limit Cycle Velocity	deg/sec	1.23	1.21	0.377	1.23	1.13	-

FILTER OUT

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	515	513.5	44.4	512	515	-
Acceleration	deg/sec^2	22.61	22.54	34.18	22.5	22.6	-
Turn-On Delay	sec	0.078	0.0755	0.027	0.082	0.0755	-
Turn-Off Delay	sec	0.047	0.047	0.0205	0.070	0.071	-
Deadband (half-width)	deg	0.772	0.768	1.419	0.772	0.768	-
Gain Ratio	sec	0.508	0.510	0.47	0.508	0.510	-
Hysteresis	% deadband	1.0	1.0	1.0	1.0	1.0	-

LIMIT CYCLE PARAMETERS

Duty Cycle	%	2.84	2.84	0.33	7.76	8.17	-
Period	sec	3.65	3.64	13.33	2.00	1.91	-
Pulse Width	sec	0.052	0.052	0.022	0.077	0.078	-
Limit Cycle Velocity	deg/sec	0.586	0.583	0.377	0.87	0.88	-

THIRD STAGE

CONTROL SYSTEM PARAMETERS

PARAMETER	UNITS	PRE-FLIGHT PREDICTION			POST-FLIGHT SIMULATION		
		PITCH	YAW	ROLL	PITCH	YAW	ROLL
Control Force	lbs	53.5	51.0	14.56	—	—	—
Acceleration	deg/sec^2	15.70	15.94	64.03	—	—	—
Turn-On Delay	sec	0.0927	0.0852	0.0395	—	—	—
Turn-Off Delay	sec	0.0713	0.0713	0.3277	—	—	—
Deadband (half-width)	deg	0.793	0.780	1.419	—	—	—
Gain Ratio	sec	0.509	0.510	0.470	—	—	—
Hysteresis	% deadband	1.0	1.0	1.0	—	—	—

LIMIT CYCLE PARAMETERS

Duty Cycle	%	4.57	4.77	1.27	—	—	—
Period	sec	3.51	3.37	4.91	—	—	—
Pulse Width	sec	0.050	0.050	0.029	—	—	—
Limit Cycle Velocity	deg/sec	0.634	0.642	0.920	—	—	—

NOTE: This data was discontinued at the start of management contract NAS1-10000 under which subsequent vehicles were manufactured.

Rev. B

TABLE CCIX - SCOUT FOURTH-STAGE SPINUP SUMMARY

VEHICLE	MEASURED SPIN RATE* rpm	PREDICTED SPIN RATE rpm	PER CENT ERROR	FRICTIONAL TORQUE** in-lbs
S-138	179.5	171.3	4.79	
S-139	--	169.72	--	--
S-140C	156.67	151.74	3.20	18.42
S-141C	174.2	169.2	2.87	34.29
S-142C	147.9	155.3	5.30	25.77
S-143C	155.1	153.4	1.12	16.65
S-144CR	124.0	124.5	0.4	67.8
S-145C	140.7	138.6	1.50	37.03
S-146C	154.3	153.3	0.65	39.11
S-147C	136.7	130.4	4.62	32.25
S-148C	134.7	129.1	4.17	32.60
S-149C	159.3	157.9	0.88	30.54
S-150C	166	156.1	6.00	42.0
S-151C	168	153.8	8.50	36.4
S-152C	--	--	--	--
S-153C	170.8	162.7	4.98	26.0
S-154C	166	159.9	4.10	34.0
S-155C	154.4	146.2	5.3	25.0
S-156C	162.8	159.5	2.01	37.6
S-157C	163.1	159.5	2.02	32.4
S-158C	168.2	167.5	0.42	48.0
S-159C	173.5	177.1	2.08	38.2
S-160C	166.9	162.5	2.64	53.1
S-161C	171.6	170.0	0.93	76.9
S-162C	169.2	171.1	1.13	45.8
S-163CR	136.4	126.1	8.1	34.2
S-164C	60.7	--	--	--
S-165C	162.7	155.7	4.30	70.0
S-166C	166.0	155.1	7.0	43.4
S-167C	154.5	149.9	2.98	77.0
S-168C	180.5	188.4	4.38	63.6
S-169C	179.1	178.5	0.34	71.5
S-170CR	137.8	135.4	1.77	39.8
S-171C	179.0	177.3	0.95	62.3
S-172C	150.7	148.0	1.33	53.8
S-173C	149.2	147.2	+1.4	42.9
S-174C	116.7	125.8	-7.2	80.9
S-175C	165.0	163.5	+0.91	57.2
S-176C	165.0	166.9	-1.1	70.4
S-177C	144.2	139.2	+3.6	41.8

* Spin rate third-stage separation from fourth stage.

** Torque due to friction in the spin bearing at station 193.69.

*** Prior to use of spin motion monitor; measurement obtained from signal strength or other means.

TABLE CCX' - SCOUT THERMAL ENVIRONMENT SUMMARY

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER															
			S-122	S-123	S-124	S-125	S-127	S-128	S-129	S-130	S-131	S-133	S-134	S-135	S-136	S-137	S-138	S-139
			MEASURED TEMPERATURE - °F															
BASE "A"	ALGOL Nozzle	-	75 15	90 35	68 8	59 9	60 8	101 37	75 11	71 16	78 6	62 12	55 5	74 31	60 5	59 22	46 4	77 6
	Servo Amplifier	160								102 49								
	Servo Actuator	275								78 26								
	Hydraulic Motor Pump	160								67 11					67 10			
	Stainless Steel Seal	-								1190 1120								
	Inboard Bearing Block	-										87 27				70 36	81 41	93 24
	Inner Skin	-										241 186		217 142				
	Fin #3 Position Potentiometer	160										70 28		94 34				
	Lanyard Release Switch	285									163 99						160 120	
	High Pressure Relief Valve	275															45 5	
	Ambient	-																
	Hydraulic Pressure Switch	160																71 6
	Power Switching Relay	160												98 36				
	Hydraulic Reservoir	275													58 4			
	Low Pressure Relief Valve	275														45 5		
	Ambient (In Line with Range Side Fin)	-																
	Barrier Temperature	-																
	Aft Ring (45° Between Fins) Temperature	-																
	Nozzle Seal (Inside) in Line with Fins Temperature	-																
ALGOL MOTOR	Case Temperature	437																
	Destruct Charge Temperature	300																
	Wiring Tunnel Skin (Sta. 520.41) Temperature	-																
LOWER "B" TRANSITION	Chamber Pressure Transducer	160									75 3							
	Chamber Pressure Switch	160									74 4						46 4	
	Safe/Arm Unit	200									75 4							
	Displacement Sensor	160									70 0							
	Auto-Destruct Lanyard Switch	285															44 4	
	Inner Skin	-		175 128					205 135		215 165	206 158		210 167	165 110	190 153	189 [illegible]	194 131

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																
			S-140C	S-141C	S-142C	S-143C	S-144CR	S-145C	S-146C	S-147C	S-148C	S-149C	S-150C	S-151C	S-152C	S-153C	S-154C	S-155C	S-156C
			MEASURED TEMPERATURE - °F																
BASE "A"	ALGOL Nozzle	-																	
	Servo Amplifier	160											85 25						
	Servo Actuator	275																	
	Hydraulic Motor Pump	160																	
	Stainless Steel Seal	-																	
	Inboard Bearing Block	-																	
	Inner Skin	-																	
	Fin #3 Position Potentiometer	160																	
	Lanyard Release Switch	285																	
	High Pressure Relief Valve	275																	
	Ambient	-	84 36	298 262	82 29	186 137	98 18	144 97	226 ① 174	144 82	100 52	106 43	103 50	127 77	163 88	148 70	81 34	91 40	111 57
	Hydraulic Pressure Switch	160																	
	Power Switching Relay	160																	
	Hydraulic Reservoir	275																	
	Low Pressure Relief Valve	275										136 76							
	Ambient (In Line with Range Side Fin)	-												56 45					
	Barrier Temperature	-																	
	Aft Ring (45° Between Fins) Temperature	-																	
	Nozzle Seal (Inside) in Line with Fins Temperature	-																	
ALGOL MOTOR	Case Temperature	437																	
	Destruct Charge Temperature	300																	
	Wiring Tunnel Skin (Sta. 520.41) Temperature	-																	
LOWER "B" TRANSITION	Chamber Pressure Transducer	160																	
	Chamber Pressure Switch	160																	
	Safe/Arm Unit	200																	
	Displacement Sensor	160																	
	Auto-Destruct Lanyard Switch	285																	
	Inner Skin	-	174 124	153 109	173 121	175 125	120 95	200 151	166 116	213 155	184 140	182 125	165 122	182 121	180 130	197 120	175 125	180 131	167 111

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																				
			S-157C	S-158C	S-159C	S-160C	S-161C	S-162C	S-163CR	S-164C	S-165C	S-166C	S-167C	S-168C	S-169C	S-170CR	S-171C	S-172C	S-173C	S-174C	S-175C	S-176C	S-177C
			MEASURED TEMPERATURE - °F																				
BASE "A"	ALGOL Nozzle	-																					
	Servo Amplifier	160																					
	Servo Actuator	275																					
	Hydraulic Motor Pump	160																					
	Stainless Steel Seal	-																					
	Inboard Bearing Block	-																					
	Inner Skin	-																					
	Fin #3 Position Potentiometer	160																					
	Lanyard Release Switch	285																					
	High Pressure Relief Valve	275																					
	Ambient	-	110 58	124 69	120 62	206 ② 228	119 67	142 89	104 70	208 153	158 97	84 10	161 93	121 47	83 26	68 14	85 18	134 22	115 38	87 37	209 121	252 200	99 23
	Hydraulic Pressure Switch	160																					
	Power Switching Relay	160																					
	Hydraulic Reservoir	275																					
	Low Pressure Relief Valve	275																					
	Ambient (In Line with Range Side Fin)	-																					
	Barrier Temperature	-														960 865							
	Aft Ring (45° Between Fins) Temperature	-														917 882							
	Nozzle Seal (Inside) in Line with Fins Temperature	-														91 1							
ALGOL MOTOR	Case Temperature	437														115 33							
	Destruct Charge Temperature	300														36 2							
	Wiring Tunnel Skin (Sta. 520.41) Temperature	-														167 91							
LOWER "B" TRANSITION	Chamber Pressure Transducer	160																					
	Chamber Pressure Switch	160																					
	Safe/Arm Unit	200																					
	Displacement Sensor	160																					
	Auto-Destruct Lanyard Switch	285																					
	Inner Skin	-	166 109	163 117	178 127	175 98	166 116	157 103	220 122	190 140	173 112	164 90	153 91	193 115	200 144								

① Maximum occurred at 47 seconds; temperature had increased to 170°F by first-stage burnout; no component malfunctions occurred. Attributed to boundary layer air leakage.

② Between 42 and 57 seconds, temperature exceeded calibration range of thermistor; no component malfunctions occurred. Attributed to hot gas leakage.

TABLE CCX Continued - SCOUT THERMAL ENVIRONMENT SUMMARY

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER															
			S-122	S-123	S-124	S-125	S-127	S-128	S-129	S-130	S-131	S-133	S-134	S-135	S-136	S-137	S-138	S-139
			MEASURED TEMPERATURE - °F															
UPPER "B" TRANSITION	Nozzle Blanket	150	136 73	82 24	80 10	82 25	95 29		275 204	164 102		101 39	122 68	93 58	99 38	71 ① 15	51 19	103 26
	Nozzle (At Veh. Sta. 477, Range Side)	700									114 25							
	Nozzle (At Veh. Sta. 477, Tower Side)	700									97 27							
	Nozzle (At Veh. Sta. 464, Tower Side)	700									87 5							
	Lower Left Roll Motor Inlet Line	120				72 18			163 91	105 32	82 5							
	Lower Left Roll Motor Valve	160				75 14					106 0							
	500-lb Motor Valve (Range Side)	160									58 9				69 6			
	Hydrogen Peroxide Tank	160																
	Left Yaw Motor Pressure Switch	160																
	Rear Dome - Castor Motor	-									77 3							
	Castor Nozzle (At Veh. Sta. 472, 180° from Tower)	700																
	Ambient	-																
	Nitrogen Tank	160														51 ① 1		
	T/M Junction Box	160													54 21			
	Left Yaw Motor Chamber	1300																
	Nitrogen Line Temperature	160																
	Hydrogen Peroxide Manifold Temperature	120																
	Hydrogen Peroxide Line Temperature	120																
	Hydrogen Peroxide Fill-Disconnect Temperature	120																
CASTOR MOTOR*																		
	Case Temperature	+17																
	Destruct Charge Temperature	300																
	Linear Shaped Charge (At Veh. Sta. 300)	300									90 20							
	Linear Shaped Charge (At Veh. Sta. 340)	300									87 17							
	Linear Shaped Charge (At Veh. Sta. 374)	300									89 19							

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																
			S-140C	S-141C	S-142C	S-143C	S-144C	S-145C	S-146C	S-147C	S-148C	S-149C	S-150C	S-151C	S-152C	S-153C	S-154C	S-155C	S-156C
			MEASURED TEMPERATURE - °F																
UPPER "B" TRANSITION	Nozzle Blanket	150		226 156															
	Nozzle (At Veh. Sta. 477, Range Side)	700																	
	Nozzle (At Veh. Sta. 477, Tower Side)	700																	
	Nozzle (At Veh. Sta. 464, Tower Side)	700																	
	Lower Left Roll Motor Inlet Line	120																	
	Lower Left Roll Motor Valve	160																	
	500-lb Motor Valve (Range Side)	160																	
	Hydrogen Peroxide Tank	160								80 7									
	Left Yaw Motor Pressure Switch	160								71 9									
	Rear Dome - Castor Motor	-																	
	Castor Nozzle (At Veh. Sta. 472, 180° from Tower)	700	85 18		81 26	82 24	222 150	66 3	74 22	80 22	74 22	98 35	94 35	132 73	104 44	116 35	65 23	71 19	71 11
	Ambient	-	119 32	195 114	132 57	131 65	203 117	147 80	129 61	135 64	187 129	135 51	153 87	188 105	142 77	156 71	124 60	135 72	132 63
	Nitrogen Tank	160	52 7	115 ② 90	50 5	13 1		54 4	55 2	72 1	57 6	64 4	55 2	55 2	71 17	56 4	54 1	53 1	57 1
	T/M Junction Box	160								84 28									
	Left Yaw Motor Chamber	1300								165 11	197 86								
	Nitrogen Line Temperature	160					74 2												
	Hydrogen Peroxide Manifold Temperature	120																	
	Hydrogen Peroxide Line Temperature	120																	
	Hydrogen Peroxide Fill-Disconnect Temperature	120																	
CASTOR MOTOR*																			
	Case Temperature	+17																	
	Destruct Charge Temperature	300																	
	Linear Shaped Charge (At Veh. Sta. 300)	300																	
	Linear Shaped Charge (At Veh. Sta. 340)	300																	
	Linear Shaped Charge (At Veh. Sta. 374)	300																	

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																				
			S-157C	S-158C	S-159C	S-160C	S-161C	S-162C	S-163C	S-164C	S-165C	S-166C	S-167C	S-168C	S-169C	S-170C	S-171C	S-172C	S-173C	S-174C	S-175C	S-176C	S-177C
			MEASURED TEMPERATURE - °F																				
UPPER "B" TRANSITION	Nozzle Blanket	150																					
	Nozzle (At Veh. Sta. 477, Range Side)	700																					
	Nozzle (At Veh. Sta. 477, Tower Side)	700																					
	Nozzle (At Veh. Sta. 464, Tower Side)	700																					
	Lower Left Roll Motor Inlet Line	120																					
	Lower Left Roll Motor Valve	160																					
	500-lb Motor Valve (Range Side)	160																					
	Hydrogen Peroxide Tank	160																					
	Left Yaw Motor Pressure Switch	160																					
	Rear Dome - Castor Motor	-																					
	Castor Nozzle (At Veh. Sta. 472, 180° from Tower)	700	70 13	103 43	165 105	76 12	90 36	58 18	111 33	232 180	77 15	81 5	100 16	232 146	78 21	95 12	184 121	188 113	105 23	76 19	99 16	70 20	99 21
	Ambient	-	124 56	152 70	196 112	114 30	138 76	129 67	155 86	227 169	145 70	137 35	159 80	198 106	138 73	159 57	164 79	166 74	169 68	136 73	175 70	144 73	160 75
	Nitrogen Tank	160	60 2	59 0	62 3	62 2	54 10	56 2	67 ③ 0	52 3	61 4	72 2	64 0	69 3	68 1	74 2	63 0	60 3	74 0	62 2	86 4	57 5	79 3
	T/M Junction Box	160																					
	Left Yaw Motor Chamber	1300																					
	Nitrogen Line Temperature	160																					
	Hydrogen Peroxide Manifold Temperature	120														78 2							
	Hydrogen Peroxide Line Temperature	120														87 9							
	Hydrogen Peroxide Fill-Disconnect Temperature	120														86 9							
CASTOR MOTOR*																							
	Case Temperature	+17														110 26							
	Destruct Charge Temperature	300														84 9							
	Linear Shaped Charge (At Veh. Sta. 300)	300																					
	Linear Shaped Charge (At Veh. Sta. 340)	300																					
	Linear Shaped Charge (At Veh. Sta. 374)	300																					

* Data for vehicle S-131 only.
① Data to 86 seconds only; T/M lost.
② Excessive rise caused by loose probe.
③ Data fluctuated but did not rise above 67°F.

TABLE CCX Continued - SCOUT THERMAL ENVIRONMENT SUMMARY

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	S-122	S-123	S-124	S-125	S-127	S-128	S-129	S-130	S-131	S-133	S-134	S-135	S-136	S-137	S-138	S-139
			SCOUT VEHICLE NUMBER — MEASURED TEMPERATURE - °F															
LOWER "C" TRANSITION	Skin	-		150 98					168 102	174 123		190 140		170 118	159 102	180 141	162 123	169 86
	Destruct Charge Connector	300			68 ① 2													
	Destruct Charge	300											53 6					
	Chamber Pressure Transducer	160									75 1							77 3
	Chamber Pressure Switch	160									78 4						46 2	
	Forward Dome	-									78 4							
	Displacement Sensor	160									71 0							
	Strain Gage (Bridge #1)	160									76 3							
	Strain Gage (Bridge #2)	160									77 6							
	Auto-Destruct Battery	167														50 1		
	Safe/Arm Unit (CASTOR)	200									74 0							71 6
UPPER "C" TRANSITION	Nozzle (At Veh. Sta. 209)		825 ② 765	800 735		748 ③ 673	621 ④ 525		230 135							417 347		
	Nozzle (At Veh. Sta. 228)	-				565 ⑤ 495			255 160									
	Nozzle (At Veh. Sta. 233)	-			209 125		622 ⑥ 525											
	Nozzle Shroud (At Veh. Sta. 228, Range Side, Outside)	430	420 ② ⑦ 360		90 20	290 ⑤ 220	219 ⑧ 137		96 ⑨ 0	92 3	375 ⑩ 300	226 ⑪ 140	308 234	214 154	366 ⑫ 311	125 65	271 ⑬ 227	371 288
	Nozzle Shroud (At Veh. Sta. 222, Range Side, Outside)	430		445 375														
	Rate Gyro Heatshield	300	183 113	132 64	87 13	127 ⑱ 64	102 ⑲ 32		108 30	93 28	167 81	119 ⑪ 56	130 69	115 50	137 72	93 34	122 ⑬ 54	152 ⑳ 58
	Aft Face of Electrical Disconnect Cover	-			76 0								80 ㉒ 0					
	3rd-Stage Aft Hat Support	300		96 46					173 105	183 133	101* 31	84 ⑪ 38		100 48	88 33	74 28	80 ⑬ 31	97 ⑳ 27
	J-40 Plug (At Veh. Sta. 235)	300			86 14								134 88					
	J-40 Disconnect Bracket	300		156 110	152 92				164 96		199 129	172 ⑪ 123	173 127	180 125	170 137	189 147	177 ⑬ 135	164 ⑳ 101
	J-19 Plug In Tunnel	300								83 35		119 65						
	Safe/Arm Unit (3259)	200											83 36					
	Safe/Arm Unit Connector (Outboard Side)	200			82 16								106 37					

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	S-140C	S-141C	S-142C	S-143C	S-144CR	S-145C	S-146C	S-147C	S-148C	S-149C	S-150C	S-151C	S-152C	S-153C	S-154C	S-155C
LOWER "C" TRANSITION	Skin	-	156 109	161 124	146 94	144 94	142 6-	179 132	157 110	159 102	184 136	149 91	159 107	159 108	152 102	183 106	145 97	160 118
	Destruct Charge Connector	300																
	Destruct Charge	300																
	Chamber Pressure Transducer	160																
	Chamber Pressure Switch	160																
	Forward Dome	-																
	Displacement Sensor	160																
	Strain Gage (Bridge #1)	160																
	Strain Gage (Bridge #2)	160																
	Auto-Destruct Battery	167																
	Safe/Arm Unit (CASTOR)	200																
UPPER "C" TRANSITION	Nozzle (At Veh. Sta. 209)																	
	Nozzle (At Veh. Sta. 228)	-																
	Nozzle (At Veh. Sta. 233)	-																
	Nozzle Shroud (At Veh. Sta. 228, Range Side, Outside)	430	316 ⑭ 260	60 10	291 ⑮ 239	320 ⑫ ⑯ 266	96 3	310 260	320 265	332 266	260 210	490 445	325 234	135 75	72 ⑰ 12	96 16	365 300	343 295
	Nozzle Shroud (At Veh. Sta. 222, Range Side, Outside)	430																
	Rate Gyro Heatshield	300	142 84	79 24	141 17	144 ㉑ 23	129 25	107 42	158 53	132 58	118 57	165 92	120 57	95 27	74 ⑰ 11	112 19	146 87	124 63
	Aft Face of Electrical Disconnect Cover	-																
	3rd-Stage Aft Hat Support	300																
	J-40 Plug (At Veh. Sta. 235)	300																
	J-40 Disconnect Bracket	300																
	J-19 Plug In Tunnel	300																
	Safe/Arm Unit (3259)	200																
	Safe/Arm Unit Connector (Outboard Side)	200																

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	S-156C	S-157C	S-158C	S-159C	S-160C	S-161C	S-162C	S-163CR	S-164C	S-165C	S-166C	S-167C	S-168C	S-169C	S-170CR	S-171C	S-172C	S-173	S-174	S-175	S-176	S-177
LOWER "C" TRANSITION	Skin	-	119 71	174 118	190 139	183 125	156 106	186 135	186 132	225 147	248 208	221 161	150 85	193 123	190 112	185 110								
	Destruct Charge Connector	300																						
	Destruct Charge	300																						
	Chamber Pressure Transducer	160																						
	Chamber Pressure Switch	160																						
	Forward Dome	-																						
	Displacement Sensor	160																						
	Strain Gage (Bridge #1)	160																						
	Strain Gage (Bridge #2)	160																						
	Auto-Destruct Battery	167																						
	Safe/Arm Unit (CASTOR)	200																						
UPPER "C" TRANSITION	Nozzle (At Veh. Sta. 209)																							
	Nozzle (At Veh. Sta. 228)	-																						
	Nozzle (At Veh. Sta. 233)	-																						
	Nozzle Shroud (At Veh. Sta. 228, Range Side, Outside)	430	415 360	352 288	289 216	70 10	402 337	130 85	380 320	166 64	65 7	370 305	110 30	107 46	107 16	270 228	350 260	75 10	188 113					
	Nozzle Shroud (At Veh. Sta. 222, Range Side, Outside)	430																						
	Rate Gyro Heatshield	300	144 80	132 63	114 45	90 19	136 69	94 32	154 90	127 33	94 32	142 68	90 3	96 81	107 17	108 40	138 53	94 19	98 27	127 9	101 38	142 45	146 85	144 57
	Aft Face of Electrical Disconnect Cover	-																						
	3rd-Stage Aft Hat Support	300																						
	J-40 Plug (At Veh. Sta. 235)	300																						
	J-40 Disconnect Bracket	300																						
	J-19 Plug In Tunnel	300																						
	Safe/Arm Unit (3259)	200															103 29							
	Safe/Arm Unit Connector (Outboard Side)	200																						

① Data available to 115 seconds only (probe came loose).
② Range and tower sides.
③ Data available to 745 seconds.
④ Data available to 680 seconds.
⑤ Data available to 790 seconds.
⑥ Data available to 645 seconds.
⑦ Data available to 290 seconds only.

⑧ Measured by resistance probe on Range side at 429 sec., also measured by thermistors on Range side 219 / 177 and Tower side 186 / 121; data available to 670 seconds.
⑨ Also measured on tower side 82 / 14.
⑩ Data available to 460 seconds only (thermistor failed).

⑪ Data available to 590 seconds.
⑫ Inside temperature also available 497 / 428.
⑬ Data available to 960 seconds.
⑭ Data available only to 500 seconds (thermistor failed).
⑮ Data available to 460 seconds only.
⑯ Data available to 525 seconds only (thermistor failed).

⑰ Data available to 200 seconds only.
⑱ Data available to 800 seconds.
⑲ Data available to 550 seconds.
⑳ Data available to 820 seconds.
㉑ Data available to 830 seconds.
㉒ Data available only to 121 seconds (Probe came loose).

TABLE CCX Continued - SCOUT THERMAL ENVIRONMENT SUMMARY

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER															
			S-122	S-123	S-124	S-125	S-127	S-128	S-129	S-130	S-131	S-132	S-134	S-135	S-136	S-137	S-138	S-139
			MEASURED TEMPERATURE - °F															
UPPER "C" TRANSITION	Shaped Charge (Near Safe/Arm Unit)	300			92 27								92 35					
	Inside Skin	-																
	T/M J-Box	257									126 50							
	Command-Destruct Receiver #1	185				81 ② 11												
	Command-Destruct Receiver #1 Battery	165																
	Nitrogen Line	160	152 82	78 23	69 0	81 26	68 6		83 4	52 4	95 21	79 22	80 28	74 17	79 22	60 13	73 21	93 23
	Nitrogen Tank	160	81 0															
	Nitrogen Relief Valve	160										79 ④ 10						
	Nitrogen Regulator	160																97 ⑤ 23
	Nitrogen Pressure Transducer	160														58 4		
	Hydrogen Peroxide Fill Line	160		66 11														
	Hydrogen Peroxide Relief Valve	160					62 10											
	Hydrogen Peroxide Tank	160												54 6				
	Hydrogen Peroxide Bleed Line	160		67 11			60 8											
	Hydrogen Peroxide Manifold Weld Joint	160				53 ⑥ 9	12 10											
	Overboard Decomposition Chamber	176	240 164	154 94			167 112											
	Lower Small Pitch Motor Valve	160	208 138	96 42	75 9	112 ⑥ 51	74 22			72 20								
	Lower Small Pitch Motor Chamber	1300											720 550					
	Lower Left Roll Motor Pressure Switch	160										97 41						
	Lower Left Roll Motor Inlet Line	160				70 ② 8												
	Left Yaw Motor	160					81 10											
	Lower Small Pitch Motor Inlet Line	160	208 138				72 12						84 33					
	Lower Small Pitch Motor Local Shield	-								170 93								
	Upper Small Pitch Motor Valve	160	210 148															
	Upper Small Pitch Motor Inlet Line	160	155 93															
	Lower Left Roll Motor Valve	160	130 94	160 72	82 4	114 ⑦ 35	111 21						100 25					

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																
			S-140C	S-141C	S-142C	S-143C	S-144CR	S-145C	S-146C	S-147C	S-148C	S-149C	S-150C	S-151C	S-152C	S-153C	S-154C	S-155C	S-156C
			MEASURED TEMPERATURE - °F																
UPPER "C" TRANSITION	Shaped Charge (Near Safe/Arm Unit)	300																	
	Inside Skin	-	181 138	205 172	156 106	181 ① 135	154 84	200 158	199 151	204 143	224 176	210 153	212 159	194 148	187 137	228 151	188 144	189 141	201 150
	T/M J-Box	257																	
	Command-Destruct Receiver #1	185																	
	Command-Destruct Receiver #1 Battery	165																	
	Nitrogen Line	160					91 12												
	Nitrogen Tank	160	66 8	63 10	72 14	81 ① 7		82 7	70 12	79 12	64 9	77 9	67 10	68 8	64 ③ 6	99 9	66 13	63 5	72 11
	Nitrogen Relief Valve	160																	
	Nitrogen Regulator	160																	
	Nitrogen Pressure Transducer	160																	
	Hydrogen Peroxide Fill Line	160																	
	Hydrogen Peroxide Relief Valve	160																	
	Hydrogen Peroxide Tank	160																	
	Hydrogen Peroxide Bleed Line	160																	
	Hydrogen Peroxide Manifold Weld Joint	160																	
	Overboard Decomposition Chamber	176																	
	Lower Small Pitch Motor Valve	160																	
	Lower Small Pitch Motor Chamber	1300																	
	Lower Left Roll Motor Pressure Switch	160																	
	Lower Left Roll Motor Inlet Line	160									70 12								
	Left Yaw Motor	160									71 13								
	Lower Small Pitch Motor Inlet Line	160																	
	Lower Small Pitch Motor Local Shield	-																	
	Upper Small Pitch Motor Valve	160																	
	Upper Small Pitch Motor Inlet Line	160																	
	Lower Left Roll Motor Valve	160									82 12								

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																				
			S-157C	S-158C	S-159C	S-160C	S-161C	S-162C	S-163CR	S-164C	S-165C	S-166C	S-167C	S-168C	S-169C	S-170CR	S-171C	S-172C	S-173	S-174	S-175	S-176	S-177
			MEASURED TEMPERATURE - °F																				
UPPER "C" TRANSITION	Shaped Charge (Near Safe/Arm Unit)	300														89 24							
	Inside Skin	-	174 118	192 139	183 125	156 106	184 135	184 132	258 173	248 202	221 161	171 100	193 123	214 136	204 150				222 136	210 155	334 284	357 300	358 274
	T/M J-Box	257																					
	Command-Destruct Receiver #1	185																					
	Command-Destruct Receiver #1 Battery	165																					
	Nitrogen Line	160																					
	Nitrogen Tank	160	71 10	66 1	76 10	67 7	59 3	68 10	98 15	77 21	82 14	83 1	74 4	92 8	65 4	88 8	76 6	71 9	94 9	68 10	100 12	67 8	101 17
	Nitrogen Relief Valve	160																					
	Nitrogen Regulator	160																					
	Nitrogen Pressure Transducer	160																					
	Hydrogen Peroxide Fill Line	160																					
	Hydrogen Peroxide Relief Valve	160																					
	Hydrogen Peroxide Tank	160																					
	Hydrogen Peroxide Bleed Line	160																					
	Hydrogen Peroxide Manifold Weld Joint	160																					
	Overboard Decomposition Chamber	176																					
	Lower Small Pitch Motor Valve	160																					
	Lower Small Pitch Motor Chamber	1300																					
	Lower Left Roll Motor Pressure Switch	160																					
	Lower Left Roll Motor Inlet Line	160																					
	Left Yaw Motor	160																					
	Lower Small Pitch Motor Inlet Line	160																					
	Lower Small Pitch Motor Local Shield	-																					
	Upper Small Pitch Motor Valve	160																					
	Upper Small Pitch Motor Inlet Line	160																					
	Lower Left Roll Motor Valve	160																					

NOTES:
① Data available to 115 seconds only (probe came loose).
② Data available to 800 seconds.
③ Data available to 200 seconds only.
④ Data available to 590 seconds.
⑤ Data available to 820 seconds.
⑥ Data available to 680 seconds.
⑦ Data available to 750 seconds.

TABLE CCX Continued - SCOUT THERMAL ENVIRONMENT SUMMARY

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																									
			S-122	S-123	S-124	S-125	S-127	S-128	S-129	S-130	S-131	S-133	S-134	S-135	S-136	S-137	S-138	S-139	S-140C	S-141C	S-142C	S-143C	S-144CR	S-145C	S-146C	S-147C	S-148C	S-149C	S-150C
			MEASURED TEMPERATURE - °F																										
ANTARES (X259) MOTOR	Destruct Charge (At Veh. Sta. 185)	300			80 22								163 112																
	Destruct Charge (At Veh. Sta. 140)	300			86 22								162 106																
LOWER "D" TRANSITION	Structure																												
	Ambient	220	140 61	111 50	95 29	122 65	116 52		131 52	118 62	117 42	128 64	115 59	121 56	107 46	110 60	103 48	130 ① 51	100 46	64 ② 8	116 48	108 ③ 48	87 13	98 41	101 38	114 42	102 46	105 40	109 46
	Guidance Package*	180 ± 10	+4 -7	+4 -6	+5 -3	+8 -0	+9 -5		+9 -7	+9 -5	+7 -7	+6 -4	+8 -6	+8 -2	+4 -8	+6 -6	+10 -8	+16 ① -15	+10 -4	+2 ⑤ -5	+6 -8	+5 ③ -2	+5 ⑦ -2	+3 -3	+2 -2	+4 -3	+1 -5	+5 -1	+6 -2
	Intervalometer	221												92 25															
	Guidance Inverter (Range Side)	221				96 ⑥ 20																							
	Telemetry Compartment (Internal)	200							91 7																				
	Telemetry Transmitter Case	185			137 32				158 19																				
	Guidance Inertial Reference Platform Container	145							108 13																				
	Spin Bearing Support	-									109 34									65 ② 17				98 23	79 <1	87 20	74 25	75 19	84 27
	Subcarrier Oscillator Rack	160																91 ① 9											
	Poppet Valve Electronics Package	160					123 33																						
	Spin Bearing Inner Race	-																											87 8
	Support Near Beacon	-																											
	Support Near T/M Transmitter																												
ALTAIR (X258) MOTOR																													
	Forward Dome (Range Side)	450															310 280												
	Cylinder (Tower Side)	450															180 134												

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																									
			S-151C	S-152C	S-153C	S-154C	S-155C	S-156C	S-157C	S-158C	S-159C	S-160C	S-161C	S-162C	S-163C	S-164C	S-165C	S-166C	S-167C	S-168C	S-169C	S-170CR	S-171C	S-172C	S-173	S-174	S-175	S-176	S-177
			MEASURED TEMPERATURE - °F																										
ANTARES (X259) MOTOR	Destruct Charge (At Veh. Sta. 185)	300																											
	Destruct Charge (At Veh. Sta. 140)	300																											
LOWER "D" TRANSITION	Structure														91 19														
	Ambient	220	98 37	68 ④ 28	114 30	102 35	111 11	103 35	108 33	112 37	109 41	94 32	108 38	103 34	128 44		114 40	91 15	119 39	120 38	112 41	99 18	106 36	106 36	129 48	107 44	122 37	104 35	118 43
	Guidance Package*	180 ± 10	+6 -6	+1 ④ -6	+4 -5	+1 -4	+7 -1	+6 -4	+5 -1	+8 -3	+4 -2	+1 -5	+5 -2	+3 -4	+1 -7	+4 -6	+2 -4	+1 -4	+1 -7	-2 -3	+12 -2	5 -10	+4 -2	+2 -4	+4 0	+7 -5	+11 0	+4 -4	+2 -4
	Intervalometer	221																											
	Guidance Inverter (Range Side)	221																											
	Telemetry Compartment (Internal)	200																											
	Telemetry Transmitter Case	185		97 ④ 9																									
	Guidance Inertial Reference Platform Container	145																											
	Spin Bearing Support	-	76 19	75 ④ 16	101 20	79 21	86 18	77 17	84 18	87 21	64 15	71 17	83 19	79 16															
	Subcarrier Oscillator Rack	160																											
	Poppet Valve Electronics Package	160																											
	Spin Bearing Inner Race	-																											
	Support Near Beacon	-					97 10																						
	Support Near T/M Transmitter						106 20																						
ALTAIR (X258) MOTOR																													
	Forward Dome (Range Side)	450																											
	Cylinder (Tower Side)	450																											

* High and low deltas from 180°F control point shown.
① Data available to 820 seconds.
② Data available to 340 seconds.
③ Data available to 830 seconds.
④ Data available to 280 seconds.
⑤ Data available to 350 seconds.
⑥ Data available to 595 seconds.
⑦ Data available to 500 seconds.

TABLE CCX Concluded - SCOUT THERMAL ENVIRONMENT SUMMARY

VEHICLE SECTION	COMPONENT TEMPERATURE MEASURED	DESIGN LIMIT °F	SCOUT VEHICLE NUMBER																																																		
			S-122	S-123	S-124	S-125	S-127	S-128	S-129	S-130	S-131	S-133	S-134	S-135	S-136	S-137	S-138	S-139	S-140C	S-141C	S-142C	S-143C	S-144CR	S-145C	S-146C	S-147C	S-148C	S-149C	S-150C	S-151C	S-152C	S-153C	S-154C	S-155C	S-156C	S-157C	S-158C	S-159C	S-160C	S-161C	S-162C	S-163CR	S-164C	S-165C	S-166C	S-167C	S-168C	S-169C	S-170CR	S-171C	S-172C	S-173	S-174	S-175	S-176	S-177
			MEASURED TEMPERATURE - °F																																																	
FW-4S MOTOR AND "E" SECTION*	FW-4S Motor Case (Temperature #1)	500																									90 4		90 ① 5																								136 57
	FW-4S Forward Dome (Temperature #2)	500									233 173																		120 41	85 35	72 ① 3																								310 220
	FW-4S Motor Nozzle	-																											225 153	87 35	76 ① 0																								1005 915
	Separation Battery	150																											58 1	52 0																									91 25
	Separation Timer	170																											69 7	67 3																									
	Structure	-																												83 18																									
	FW-4S Motor Attach Flange	500																													76 ① 0																								
	FW-4S Motor Forward Dome 5.6" from ℄ (Tower Side)	500																																						305 240																
	FW-4S Motor Forward Dome 5.6" from ℄ (Range Side)	500																																						290 225																
	FW-4S Motor Forward Dome 8.2" from ℄ (Tower Side)	500																																						370 295																350 260
	FW-4S Motor Forward Dome 8.2" from ℄ (Range Side)	500																																						370 290																
HEATSHIELD (34")**																																																							
	Forward Cone (Range Side)	-									77 4																																												
	Forward Cone (Tower Side)	-									76 2																																												
	Cylinder (Range Side)	-									75 0																																												
	Cylinder (Tower Side)	-									72 0																																												
HEATSHIELD (42")																																																							
	Inside Stagnation Point Temperature	-																			115 50																																	
	Inside Surface (4.7" off Stagnation Point Temperature	-																			114 50																																	
	Inside Surface Conical Section Temperature	-																			100 37																																	
	Inside Surface Cylindrical Sec. Temperature	-																			90 27																																	

* Data not available for vehicles prior to S-131.

** Data available for vehicle S-131 only.

① Data available to 240 seconds.

between first-stage ignition and separation of the stage in which the temperature was measured. The lower right corner of the block shows the corresponding temperature rise. The maximum temperature is presented for use in comparison with allowable temperature. The temperature rise is more meaningful for comparison between vehicles with different initial temperatures. For the guidance package in lower "D" section the high and low values about the 180° F control temperature are recorded.

(q) Table CCXI presents a summary of the altitude, velocity, path angle, and flight azimuth at fourth-stage burnout.

TABLE CCXI - CONDITIONS AT FOURTH-STAGE BURNOUT

VEHICLE	ALTITUDE n. mi.			VELOCITY fps			PATH ANGLE deg			FLIGHT AZIMUTH deg		
	PREDICTED	OBSERVED	DEVIATION	PREDICTED	OBSERVED	DEVIATION	PREDICTED	OBSERVED	DEVIATION	PREDICTED	OBSERVED	DEVIATION
S-138	383.9	387.0	+3.1	24866	24757	-109	+0.08	+0.10	+0.02	148.67	148.13	-0.54
S-139	404.3	413.2	+8.9	24546	24517	- 29	0.00	+0.05	+0.5	165.20	165.39	+0.19
S-140C	506.8	506.6	-0.2	24272	24339	+ 67	-0.06	-0.43	-0.37	180.00	179.09	-0.91
S-141C*	80.4	81.2	+0.8	22597	22590	- 7	-7.11	-7.98	-0.87	132.61	132.39	-0.22
S-142C	487.1	491.2	+4.1	24358	24501	+143	0.00	-0.86	-0.86	180.00	179.71	-0.29
S-143C	482.9	486.4	+3,5	24374	24484	+110	-0.01	+0.10	+0.11	180.00	179.72	-0.28
S-144CR(a)	49.9	55.6	+5.7	21755	21610	-145	-39.95	-40.92	-0.97	117.09	115.60	-1.49
S-145C	200.5	196.6	-3.9	28607	28618	+ 11	+0.02	-0.75	-0.77	171.66	172.13	+0.47
S-146C	496.0	491.5	-4.5	24334	24308	- 26	+0.21	-0.45	-0.66	180.00	180.00	0.00
S-147C	348.7	354.3	+5.6	27345	27349	+ 4	+0.01	-0.94	-0.95	121.13	120.88	-0.25
S-148C	198.6	200.5	+1.9	28048	28024	- 24	-0.03	-0.22	-0.19	171.64	171.10	-0.54
S-149C	577.2	576.3	-0.9	24078	24050	- 28	0	+0.16	+0.16	180.00	178.82	-1.18
S-150C	178.8	179.5	+0.7	26408	26373	- 35	-0.02	-0.66	-0.64	171.56	171.42	-0.14
S-153C	117.5	116.6	-0.9	26049	25984	- 65	+0.11	-0.55	-0.66	89.50	89.37	-0.13
S-154C	578.3	576.3	-2.0	24080	24030	- 50	+0.02	+0.12	+0.10	179.96	180.26	+0.30
S-155C	280.2	273.9	-6.3	24979	25070	+ 91	+0.03	-0.06	-0.09	169.64	169.82	+0.18
S-156C	583.5	584.7	+1.2	24068	24016	- 52	+0.02	-0.05	-0.07	180.00	179.57	-0.43
S-157C	566.6	568.6	+2.0	24131	24096	- 35	+0.06	-0.12	-0.18	180.00	179.27	-0.73
S-158C	236.1	233.2	-2.9	25114	25115	+ 1	+0.08	-0.12	+0.04	180.00	180.70	+0.70
S-159C*	74.7	76.0	+1.3	25026	24860	-166	-14.94	-15.14	-0.20	115.66	115.00	-0.66
S-160C	464.2	428.0	-36.2	24369	24323	- 46	+0.03	-1.33	-1.36	147.29	146.53	-0.76
S-161C	191.4	184.7	-6.7	25922	25937	+ 15	+0.10	-0.40	-0.50	188.87	187.77	-1.10
S-162C	582.9	579.5	-3.4	24090	24044	- 46	+0.09	-0.40	-0.49	180.00	179.98	-0.02
S-163CR	120.1	119.6	-0.4	33069	32941	-128	-0.01	+0.45	+0.48	90.87	90.75	-0.12
S-164C***	49.4	51.7	+2.3	19748	19570	-178	-19.99	-20.80	-0.81	116.98	116.10	-0.88
S-165C	377.0	374.5	-2.5	25957	26028	+ 71	-0.03	-0.75	-0.72	171.76	170.40	-1.36
S-166C	294.3	298.3	+4.0	31451	31337	-114	+58.90	+58.97	+0.07	111.93	111.56	-0.37
S-167C	147.4	147.6	+0.2	26469	26498	+ 29	-0.06	-0.64	+0.58	184.35	184.10	-0.25
S-168C*	72.7	78.4	+5.7	24932	24860	- 72	-15.09	-15.05	+0.04	115.63	115.54	-0.09
S-169C	214.8	213.4	+1.4	27270	27234	- 36	+0.14	0.00	-0.14	193.31	193.62	+0.31
S-170CR	301.0	299.7	-1.3	23207	23188	- 19	+0.05	0.82	-0.87	89.21	88.56	-0.65
S-171C**	74.2	76.5	+2.3	24271	24032	-239	-15.01	-15.42	-0.41	115.54	114.82	-0.72
S-172C	216.0	210.8	-5.2	25212	25115	- 97	+ 0.01	- 0.13	-0.014	175.72	174.79	-0.93
S-173C	115.2	120.0	+4.8	26039	25957	- 82	- 0.02	- 0.08	-0.06	89.22	88.17	-1.05
S-174C	169.7	166.8	-2.9	25588	25554	- 34	- 0.017	- 0.167	-0.150	103.436	102.750	-0.686
S-175C	294.0	293.7	-0.3	24900	24911	+ 11	- 0.091	- 0.148	-0.057	88.956	89.064	+0.108
S-176C	586.4	578.2	-8.2	24048	24054	+ 6	- 0.06	- 1.01	-0.95	180.00	180.02	+0.02
S-177C	323.4	323.9	+0.5	24782	24705	- 77	- 0.01	- 0.65	-0.64	137.25	136.71	-0.54

* Probe or reentry mission; parameters are relative values.
** Three-stage reentry; conditions given are for third-stage burnout.
*** Three-stage reentry; parameters are relative values and conditions are at reentry.
(a) Reentry mission; parameters are relative values at reentry.

(r) Table CCXII presents complete historical data on the first-stage pitch program, maximum control surface deflections and roll transients.

TABLE CCXII - SCOUT FIRST-STAGE PITCH PROGRAM, MAXIMUM CONTROL SURFACE DEFLECTIONS AND ROLL TRANSIENTS

VEHICLE	PITCH AT LIFT-OFF		FIRST-STAGE PITCH PROGRAM				MAXIMUM CONTROL SURFACE DEFLECTIONS								ROLL TRANSIENTS AFTER IGNITION		
			MAXIMUM COMMANDED RATE		MAXIMUM PITCH CONTROL DEFLECTION DURING MAXIMUM RATE		PITCH				YAW						
							BOOST		COAST		BOOST		COAST				
	deg	Flt. Time sec	Rate deg/sec	Flt. Time sec	deg	sec	Defl. deg	Flt. Time sec	Defl. deg	Flt. Time sec	Defl. deg	Flt. Time sec	Defl. deg	Flt. Time sec	Max. Angle deg	Max. Mom't ft-lbs	Flt. Time sec
S-122	+0.33	1.9	-3.57	2.9 - 7.9	+17.8	4.5	+17.8	4.5	+5.9	65	+6.8	29	+13.2	75	-1.9		6.3
S-123	+0.23	2.9	-2.8	2.9 - 7.9	+14.46	4.45	+14.46	4.45	+5.7	75	+5.0	8.7	+1.7	73	-2.5		10
S-124	+0.45	2.4	-1.5	2.9 - 6.9	+11.0	4.5	+11.0	9.8	+5.7	61.5	+5.7	13	+3.3	69	-1.2		8
S-125	-0.35	2.5	-3.97	2.9 - 7.4	+18.0	4.5	+18.0	4.5	+8.6	67.5	+7.6	26.3	-4.2	69.5	-2.3		9.7
S-127	+1.8	2.6	-3.05	2.9 - 7.9	+16.7	4.5	+16.7	4.5	+13.2	87	+12.4	27.5	-3.5	65	1.95		9
S-128	+1.0	2.4	-3.99	2.4 - 7.4	+18.2	3.2-4.7	+18.2	3.2-4.7	+8.0	74	+8.6	3,11,22	-2.7	81	-1.05		7.5
S-129	+0.43	1.5	-3.34	2.9 - 7.9	+15.0	4.5	+15.0	4.5	+12.0	76	+6.6	30.5	-3.0	65	-2.2		8.6
S-130	+0.9	3.0	-3.72	2.9 - 6.9	+16.8	4.1	+16.8	4.1	+18.5	76	+11.0	28.5	+3.1	81	+1.2		8.5
S-131	+0.45	2.5	-2.38	2.9 - 7.5	+8.5	4.2	+8.5	4.2	+6.5	73	+8.2	29	+1.0	73	-1.5		5.2
S-133	+0.8	1.9	-3.76	2.9 - 8.4	+15.5	4.8	+15.5	4.8	+9.8	83	-11.0	30	+4.0	79	+3.52		8.5
S-134	-0.15	2.0	-3.63	2.9 - 7.4	+13.7	4.4	+13.7	4.4	+7.5	62	-4.2	21	-2.7	68	+1.27		6.9
S-135	Negligible		-3.0	2.9 - 9.6	+11.4	9.6	+11.4	9.6	+7.1	76	+4.5	30	+8.9	80	-1.21		6
S-136	+0.9	2.2	-2.6	3.0 - 8.5	+13.2	4.2	+13.2	4.2	+4.3	69.5	-8.3	21	-5.3	72	-1.34		4.5
S-137	Negligible		-3.63	2.4 - 8.9	+17.0	4	+17.0	4	+10.0	30	-7.8	29	+2.3	77	+1.33		11
S-138	-0.16	2.4	-3.27	2.9 - 7.6	+15.9	4.5	+15.9	4.5	+16.0	79	+8.2	25	+13.0	76	+0.35		0.7
S-139	+0.37	2.6	-2.63	2.9 - 8.3	+13.1	4.0	+13.1	4.0	+10.5	75	+4.0	23.5	+11.0	79	+1.7		5
S-140C	+0.5	2.23	-2.5	2.9 - 7.9	+15.0	4.3	+15.0	4.3	+12.9	79.2	+8.0	30	+14.6	79.2	-1.36		5
S-141C	-0.27	2.77	-3.0	2.9 - 7.9	+7.5	4.0	+7.5	4.0	+7.3	73	-11.4	3	+3.3	70		-90	3
S-142C	+0.27	2.8	-2.52	2.9 - 8.95	+12.0	4.0	+12.0	4.0	+8.4	69	+7.0	33	+14.0	79	-0.75		5
S-143C	-0.26	0.24	-2.43	2.9 - 8.39	+11.5	4.5	+11.5	4.5	+8.2	77	+3.5	13	+11.3	79		+117	1
S-145C	-0.17	1.88	-2.96	2.9 - 7.91	+12.5	4.4	+12.5	4.4	+6.4	85.4	+3.9	31.5	+4.7	84		+80	0.7
S-146C	+0.45	2.7	-2.42	2.9 - 7.9	+12.5	4.2	+12.5	4.2	+7.5	75	-4.0	21.2	+3.7	75		+202	3.4
S-147C	-0.12	0.18	-3.0	2.9 - 7.9	+12.6	4.3	+12.6	4.3	+5.5	81	+10.1	22.3	+3.0	78		-66	3.2
S-148C	+0.2	2.7	-2.91	2.91 - 7.91	+14.0	4.3	+14.0	4.3	+8.4	76	+2.7	21.0	-5.5	82.5		+101	3
S-149C	0.0	--	-2.45	2.98 - 7.97	+12.6	4.3	+12.6	4.3	+4.5	77	+4.10	12.7	-3.8	77		-40	1
S-150C	+0.15	2.8	-3.05	2.98 - 7.99	+14.7	4.3	+14.7	4.3	+8.2	75	+3.5	26	+6.9	77		+162	1
S-151C	+0.35	2.0	-2.82	2.99 - 7.99	+12.7	4.4	+12.7	4.4	+8.7	72	+13.3	27	+5.7	80.9		+225	0.5
S-152C	-0.46	2.37	-2.49	2.98 - 7.98	+12.6	5.0	+12.6	5.0	+4.1	70.5	+10.7	28	-2.0	75		+100	1.0
S-153C	None		-2.96	2.97 - 7.97	+10.5	4.1	+10.5	4.1	+7.7	59	+5.5	5.3	-2.5	58.5			
S-154C	+0.54	2.88	-2.62	2.98 - 8.07	+13.7	4.5	+13.7	4.48	+5.87	76	+9.59	34.5	+1.05	76		+130	
S-155C	-0.26	2.50	-3.62	2.97 - 7.97	+19.1	4.5	+19.1	4.5	+6.14	81	+4.48	28	+8.99	80.5		+115	0.5
S-156C	-0.43	--	-2.60	2.97 - 7.97	+10.2	4.5	+10.2	4.5	+8.7	65	-2.4	21.5	+1.6	74.0		+58	0.5
S-157C	-0.20	2.20	-2.46	2.98 - 7.98	+13.5	4.5	+13.5	4.5	+6.3	75.5	+7.6	31.0	+3.1	64.0		+191	3.0
S-158C	-0.23	2.79	-2.69	2.97 - 7.97	+8.7	4.3	+8.7	4.3	+5.9	64.0	+11.8	27.3	+5.2	79.5		+103	1.8
S-159C	+1.13	2.80	-2.83	2.99 - 8.05	+19.7	4.5	+19.7	4.5	+6.7	74.5	+5.7	35.9	-4.2	59.8		+114	0.5
S-160C	-0.17	1.87	-2.47	2.99 - 7.67	+13.6	4.5	+16.8	51.0	+18.7	54.0	-8.3	51.2	-6.0	63.0		+66	0.7
S-161C	-0.39	2.74	-2.22	3.00 - 8.00	+11.5	5.0	+11.5	5.0	+5.0	73.0	+7.9	34.5	+7.1	71.5		+84	0.5
S-162C	-0.35	2.38	-2.44	2.99 - 7.69	+9.4	4.5	-12.0	24.5	+2.4	73.0	-7.3	24.0	+8.6	70.0		+45	2.0
S-164C	+1.77	2.98	-2.99	2.43 - 7.78	+13.0	3.8	+13.0	3.8	+8.6	70.4	+11.3	29.5	+7.7	81.0		+170	3.0
S-165C	-0.28	0.51	-2.64	3.00 - 8.00	+11.9	4.5	+11.9	4.5	+5.7	67.0	+4.1	22.5	-4.5	74.5		+25	0.5
S-167C	+0.50	2.21	-2.74	3.00 - 8.00	+10.5	4.4	+10.5	4.4	+7.1	72.5	+3.9	13.4	+3.1	72.0		-30	1.5
S-168C	+0.48	2.02	-2.79	3.00 - 8.00	+11.9	4.5	+11.9	4.5	+6.0	50.0	-7.2	16.5	+2.1	49.5		-130	3.0
S-169C	-0.32	2.80	-2.63	2.99 - 7.99	+8.3	4.5	+8.3	4.5	+9.1	75.5	-3.9	13.5	+10.4	76.5		-135	0.5
S-172C	-0.21	0.15	-2.07	3.00 - 8.00	+10.2	5.0	+10.2	5.0	+5.8	71.0	+2.9	47.0	+3.3	70.0		-28	1.5
S-173C	-0.51	0.15	-2.92	3.00 - 7.00	+9.8	4.5	+9.8	4.5	+8.4	68.0	+8.1	15.2	+7.2	83.5		-112	1.0
S-174C	+0.11	1.50	-3.12	3.00 - 8.02	+10.0	4.5	+10.0	4.5	+9.8	77.0	-2.9	37.5	+3.9	74.5		- 95	0.5
S-175C	+0.28	0.40	-2.44	3.00 - 8.00	+7.2	4.8	+7.2	4.8	+8.9	67.5	+2.9	30.0	-4.2	79.0		N/A	N/A
S-176C	-0.11	0.10	-2.29	3.00 - 7.99	+12.80	4.9	+12.8	4.9	+8.20	71.0	-3.50	29.5	+1.70	51.8		+ 90	3.5
S-177C	+0.16	1.20	-2.75	3.00 - 7.90	+8.5	4.5	+8.5	4.5	+4.6	48.5	+4.5	6.5	-3.1	72.5		+ 16	0.5

Rates & Displacements:
Pitch, + = Nose Up
Yaw, + = Nose Right
Roll, + = Clockwise

Control Surface Deflections:
Pitch, + = Trailing Edge Down
Yaw, + = Trailing Edge Left
Roll, + = Fin 3 Trailing Edge Left

Moment Disturbance:
Roll, + = Clockwise

(s) Orbital Parameters

Table CCXIII presents a summary of orbital conditions for Phase IV and V vehicles, as available, with the exception of S-151C and S-152C which did not place a spacecraft in orbit and S-144CR, S-159C, S-164C, S-166C, S-168C, and S-171C, which were not orbital missions.

TABLE CCXIII - SCOUT ORBITAL PARAMETERS

VEHICLE	APOGEE n. mi.			PERIGEE n. mi.			INCLINATION deg			PERIOD min.		
	PREDICTED	OBSERVED	DEVIATION	PREDICTED	OBSERVED	DEVIATION	PREDICTED	OBSERVED	DEVIATION	PREDICTED	OBSERVED	DEVIATION
S-138	544.0	483.1	-60.9	383.7	386.6	+2.9	60.19	59.70	-0.49	101.95*	100.82*	-1.13
S-139	404.3	415.2	+10.9	402.0	408.3	+6.3	75.70	75.88	+0.18	99.58*	99.91*	+0.33
S-140C	535.4	590.0	+54.6	506.2	495.7	-10.5	90.00	89.10	-0.90	104.18*	105.06*	+0.88
S-141C				(Not Applicable - 5-stage Re-entry)								
S-142C	531.7	660.7	+129.0	487.1	470.1	-17.0	90.00	89.71	-0.29	103.74*	105.95*	+2.21
S-143C	529.3	613.4	+84.1	482.9	486.0	+3.1	90.00	89.73	-0.27	103.61	105.33	+1.72
S-144CR				(Not Applicable - 4-stage Re-entry)								
S-145C	3114.7	3102.3	-12.4	200.5	195.2	-5.3	82.00	82.46	+0.46	152.13	151.73	-0.40
S-146C	547.3	534.6	-12.7	491.9	469.1	-22.8	90.00	90.00	0.00	104.14	103.44	-0.70
S-147C	2519.6	2558.3	+38.7	348.7	351.5	+2.8	40.99	40.82	-0.17	142.24	143.14	+0.90
S-148C	2439.4	2423.8	-15.6	198.6	200.4	+1.8	82.0	81.47	-0.53	137.22	136.92	-0.30
S-149C	619.0	602.3	-16.7	577.2	571.5	-5.7	90.00	88.85	-1.15	107.25	106.81	-0.44
S-150C	887.6	868.2	-19.4	178.7	176.4	-2.3	82.11	81.98	-0.13	104.68	104.25*	-0.43
S-153C	438.4	398.2	-40.2	117.3	113.5	-4.2	2.92	2.88	-0.04	94.92	94.15	-0.77
S-154C	623.6	589.4	-34.2	578.2	571.1	-7.1	89.96	90.25	+0.29	107.36	106.54	-0.82
S-155C	294.3	330.0	+35.7	280.0	273.9	-6.1	80.00	80.17	+0.17	95.10	95.67	+0.57
S-156C	631.5	600.5	-31.0	583.5	584.0	+0.5	90.00	89.58	-0.42	107.63	107.02	-0.61
S-157C	623.1	607.2	-15.9	566.4	566.8	+0.4	90.00	89.29	-0.71	107.12	106.81	-0.31
S-158C	244.4	241.2	-3.2	233.1	225.2	-7.9	90.00	90.66	+0.66	93.26	93.05	-0.21
S-159C				(Not Applicable - 4-stage Re-entry)								
S-160C	469.9	481.7	+11.8	463.4	279.9	-183.5	60.00	59.41	-0.59	102.06	98.71	-3.35
S-161C	599.1	587.1	-12.0	191.3	182.9	-8.4	98.20	97.20	-1.00	99.27	98.88	-0.39
S-162C	645.4	621.2	-24.2	582.3	560.8	-21.5	90.00	89.98	-0.02	107.88	106.97	-0.91
S-163CR	15433.2	14531.5	-901.7	120.1	119.3	-0.8	3.5	3.6	-0.1	496.9	467.2	-23.7
S-164C				(Not Applicable - 3-stage Re-entry)								
S-165C	1320.1	1372.5	+52.4	377.0	371.4	-5.6	81.99	80.67	-1.32	117.39	118.35	+0.96
S-166C				(Not Applicable - 4-stage Probe)								
S-167C	812.0	835.7	+23.7	147.4	144.8	-2.5	94.00	93.77	-0.23	102.57	102.98	+0.41
S-168C				(Not Applicable - 4-stage Re-entry)								
S-169C	1744.5	1704.3	-40.2	214.8	213.4	-1.4	102.67	102.96	+0.29	122.81	121.94	-0.87
S-170CR	299.8	341.2	+41.4	299.2	239.9	-59.3	1.8	1.9	+0.1	95.7	95.4	-0.3
S-171C				(Not Applicable - 4-stage Re-entry)								
S-172C	237.8	212.2	-25.6	216.0	164.7	-51.3	86.00	85.13	-0.87	92.81	91.35	-1.46
S-173C	424.4	390.4	-34.0	115.2	120.0	+4.8	2.9	3.2	+0.3	94.6	94.1	-0.5
S-174C	317.4	288.9	-28.5	169.7	165.9	-3.8	37.686	37.424	-0.262	93.442	92.829	-0.613
S-175C	301.6	308.6	+ 7.0	289.3	287.4	-1.9	2.914	3.036	+0.122	95.591	95.690	+0.099
S-176C	627.1	664.6	+37.5	586.0	519.9	-66.1	90.0	90.02	+0.02	N/A	N/A	N/A
S-177C	323.4	345.3	+21.9	30 .8	238.9	-65.9	51.43	51.05	-0.38	96.14	95.30	-0.84

(t) Ignition System

Reliability is achieved by employing a completely dualized ignition system. Safety features have been designed into the systems to prevent accidental or premature firing of the rocket motors. Dual squibs are used in all igniters. Each of the squibs on the standard vehicle is in a separate circuit and is connected to a separate battery so that an electrical component failure will affect only one circuit. Ignition of the first-stage motor is accomplished by a direct electrical signal provided by launch blockhouse command. Second-, third-, and fourth-stage ignitions are controlled by the guidance program timer. Fifth-stage ignition (when applicable) is controlled by a single independent ignition system.

The ignition system contains automatically-activated silver cell battery packs, timer actuated control relays, safe-arm latching relays for arming the heat shield, spin motors, separation bolts, and motor igniter circuits. The same primary power sources are utilized by the ignition and destruct systems. A block diagram of the ignition system is shown in figure 66.

The 23-003793 initiator (figure 67) is used in the Algol II, Algol II, and Castor II rocket motors. The initiator has a steel case containing the bridgewire, electrical pins, ceramic seal, insulators, primer explosive charge, main explosive charge and moisture closures. A bridgewire is attached to pins A-B. The pins and ceramic assembly are bonded into the case. The primer charge is molded around the bridgewire inside an insulator cup. The main explosive charge is insulated from the case and primer charge and sealed with Mylar. The case is sealed with another closure and crimped and bonded into place.

The Antares (250) rocket motor igniter squib, Hercules Powder SD60EO is shown in figure 68. This unit has the explosive train enclosed in a bronze case crimped within the main steel body. The bronze case contains the bridgewires and detonation charge, delay fuse (1.5 to 1.5 seconds), main charge, and weather closure.

The Altair II (X258) and Altair III (FW-4S) rocket motors use the Hercules Powder SD60A1 initiator (figure 68). This unit is similar to the SD60EO except that the steel exterior case is much longer to accommodate a longer delay fuse (5.5 to 7.24 seconds).

(u) Payload Mounting and Separation

The Scout vehicle provides two adapters for mating payloads to the fourth-stage motor. The "E-G" section is used for lightweight (approximately 200 pounds with c.g. at station 24.0) payloads while the "E" section

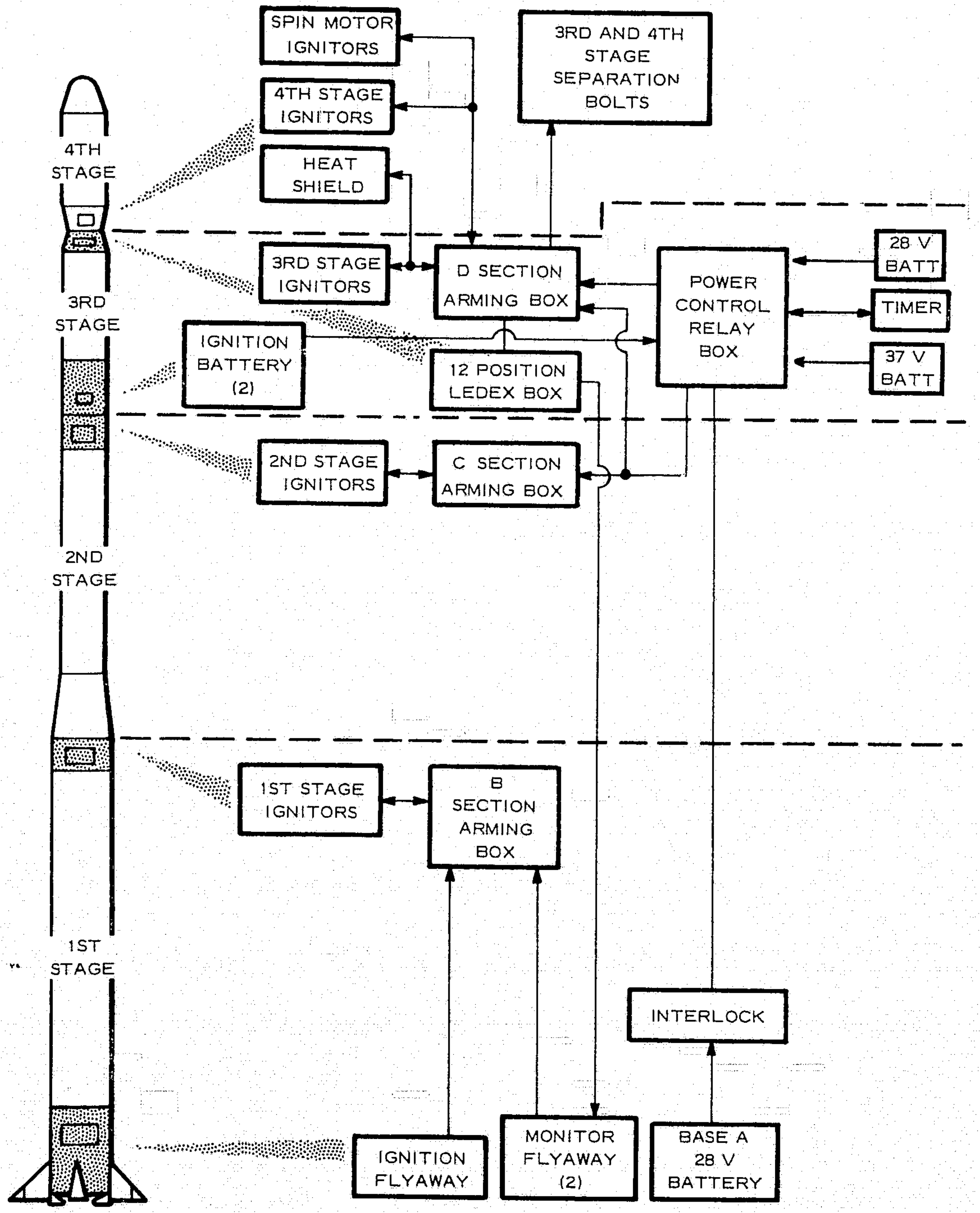


Figure 66.- Ignition system block diagram.

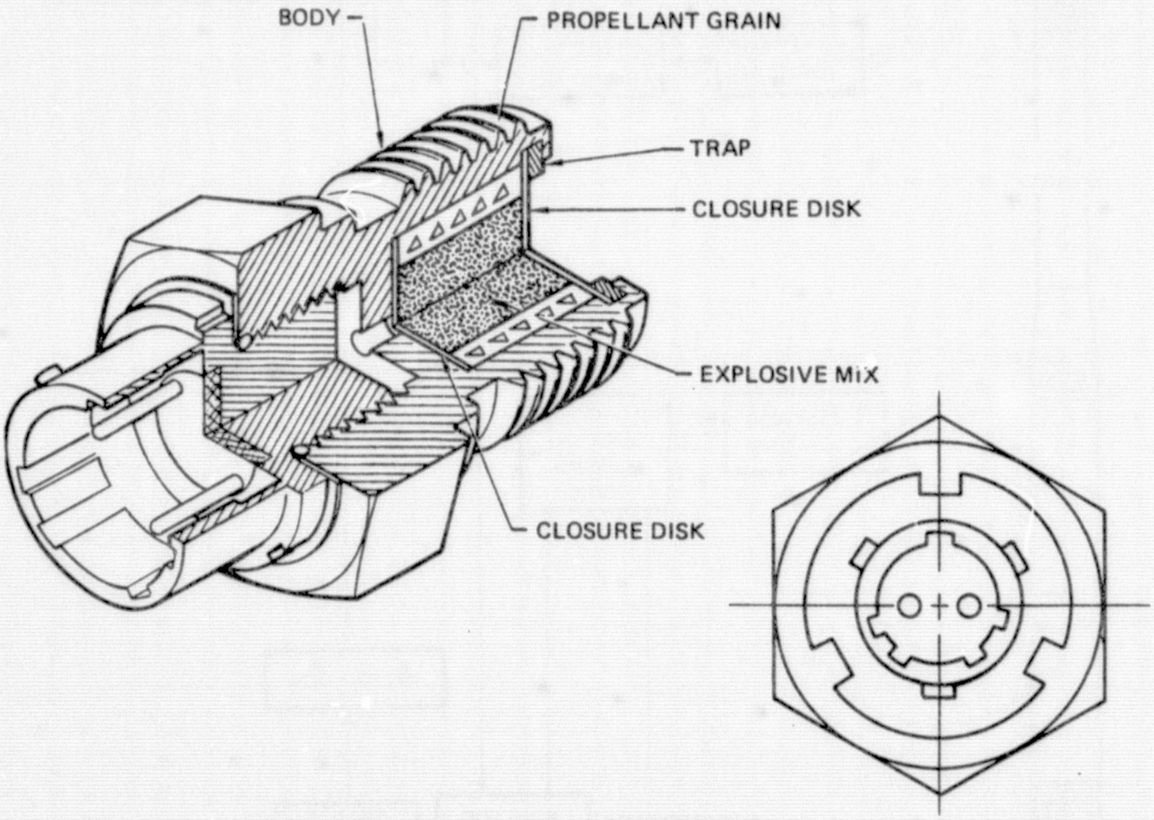


Figure 67.- 23-003793 Initiator Assembly.

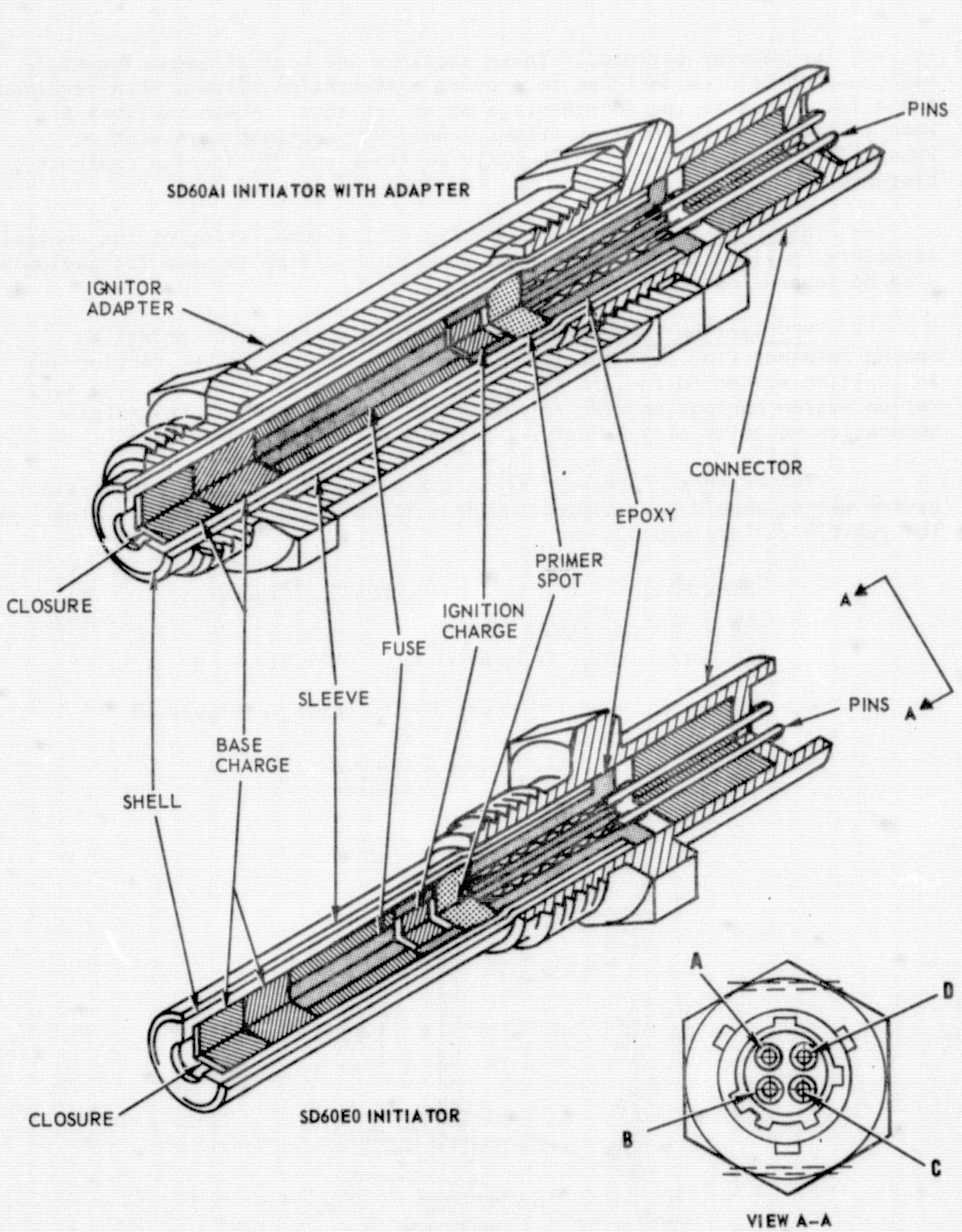


Figure 68.- Hercules Initiator Assembly Details.

is used for heavier payloads. These sections are conical magnesium semi-monocoque structures designed to provide a separation system, when required, and allow access to the fourth-stage motor igniters. These sections are each available in two configurations. Only "E" sections were used on Phases IV and V vehicles. Table CCXIV outlines the "E" section contractual history.

Basic "E" Section - This configuration (consisting of the conical structure, payload support ring, and separation clamp) is used for payloads with no separation requirements.

"E" Section Separation System - This system adds springs, a spring retainer ring, and pyrotechnic units, to the basic "E" section and an ignition system to the aft flange of the fourth-stage motor. The separation system springs provide sufficient energy to impart a relative separation velocity of 3.4 feet per second to a 200-pound payload.

The weights of these systems are given below. The appropriate system weight should be included in the total payload weight when using the vehicle performance curves.

Component	Weight (Pounds)
Basic "E" Section	7.64
"E" Section Plus Separation	21.01

A sketch of a typical "E" section is shown in figure 69.

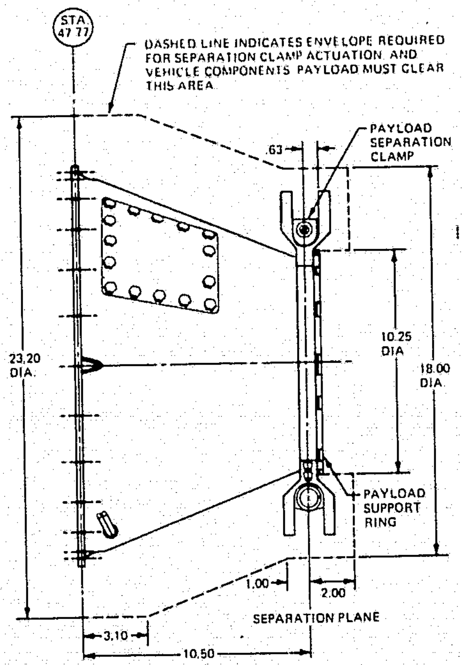


Figure 69.- Payload Adapter "E" Section.

TABLE CCXIV - SCOUT "E" SECTION PROCUREMENT

P.R. NO.	CONTRACT	ITEM	FUNDS	AMOUNT
DESIGN AND TESTING French-A, ESRO-IIA, SSS (1,3,6) ESRO I, OWL, ADIE-C (12-15)				
P05039	NAS1-1928-T1	E-Section Design	890-VC	$ 68,996.00
20.200.578	NAS1-1928-T1-1	Separation System Mod.(1,3,6)	497-SD(P)	41,904.00
20.200.442	NAS1-1928-T1-2	Battery Boxes	497-SD(G)	1,100.00
20.200.443	NAS1-1928-T1-2	Amp. Fact. Meas.	497-SD(P)	800.00
20.200.504	NAS1-1928-T1-3(c3)	Ignition Circuit Eval.	497-SE(S)	3,060.00
20.200.587	NAS1-1928-T1-3(c3)	Ignition Circuit Eval.	497-SE(P)	3,303.00
60.400.214	NAS1-3899-T24	4 E-Sections for Testing	490-PE(S)	11,478.00
60.400.401	NAS1-3899-T44	4 E-Sections and Testing	497-SG(P)	12,000.00
60.400.493	NAS1-3899-T44	4 E-Sections Completed	497-SG(P)	8,412.00
60.400.763	NAS1-3899-T44-1	4 E-Section Sep. Systems	497-SH(P)	522.00
60.400.962	NAS1-3899-T44-2	4 E-Section Sep. Systems	490-PJ(MM)	79.00
		DESIGN AND TESTING SUBTOTAL		$151,654.00
1 SEV AND 1 SOLRAD-A (1P-2P)				
20.200.546	NAS1-1928-T1-2(c1)	2 Flt. E-Sections & Overrun	497-SD(P)	$ 66,609.00
60.400.446	NAS1-3589-20(c49)	Rework & Tests E-Sect. S-138R	490-PF(S)	6,000.00
60.400.343	NAS1-3899-T36	Marman Clamp Sep.Test, S-131R	497-SE(S)	3,000.00
60.400.367	NAS1-3899-T36	Marman Clamp Sep.Test, S-138R	490-PF(S)	9,022.00
60.400.545	NAS1-3899-T36-1	Marman Clamp Completion	490-PF(S)	3,635.00
		SEV AND SOLRAD SUBTOTAL		$ 88,266.00
2 UK (C & E) AND TIMERS (4-5)				
60.400.331	NAS1-3899-T38	Timers, UK	870-F	$ 60,000.00
60.400.331	NAS1-3899-T38	2 Flight E-Sections(from T24)	497-SDF(P)	15,000.00
60.400.573	NAS1-3899-T38	Timers Overrun	870-F	20,000.00
60.400.598	NAS1-3899-T38-1	Mod. 2 E-Sect. Sep. Systems	497-SF(P)	9,858.00
60.400.214	NAS1-3899-T24	2 E-Sections	490-PE(S)	5,738.00
60.400.962	NAS1-3899-T38-3	2 E-Sections	490-PJ(MM)	964.00
		UK (C & E) AND TIMERS SUBTOTAL		$111,560.00
INSTRUMENTATION (131,138,150,151,152,158,161,172, FR-2 & SOLRAD)				
60.400.260	NAS1-3420-16(c26)	E-Section T/M Spares	490-PE(S)	$ 12,500.00
60.400.764	NAS1-3899-T38-2	4 E-Sect. Suitcase Checkers	497-SH(P)	1,048.00
60.400.438	NAS1-4664-6	4 E-Section Instrumentation	497-SF(P)	90,764.00
60.400.584	NAS1-4664-10	Checkout E-Section	490-PF(S)	1,985.00
60.400.485	NAS1-5592-1	2 Timers Completed	490-PF(S)	2,285.00
60.900.029	NAS1-7256-19-J	E-Sect. Instrument., S-144CR	490-PJ(MM)	30,000.00
60.900.040	NAS1-7256-19-J	E-Sect. Instrument., S-144CR	490-PJ(MM)	24,650.00

TABLE CCXIV Continued - SCOUT "E" SECTION PROCUREMENT

P.R. NO.	CONTRACT	ITEM	FUNDS	AMOUNT
INSTRUMENTATION Continued				
60.400.544	NAS1-5592-1	2 Timers	490-PF(S)	$ 11,090.00
60.400.620	NAS1-5592-8(c3)	Batteries for E-Sect. Timers	497-SF(P)	12,366.00
60.400.649	NAS1-6020-8-Cal-L	E-Sect. T/M Batteries	497-SFGH(S)	7,200.00
60.400.649	NAS1-6020-8-Cal-L	E-Sect. T/M Batteries	497-SH(S)	5,222.57
60.400.939	NAS1-7256-18(M6)-J	Instrumented E-Section	490-PJ(M)	74,600.00
60.400.939	NAS1-7256	ESRO-IIB (172)		98,850.00
60.400.934	NAS1-9154-1	Flight Tape Recorder	490-PI(P)	24,176.00
		INSTRUMENTATION SUBTOTAL		$396,736.57
(5) SOLRAD-B, ESRO-IA, IIA, IIB, GRS-A1 & TIMERS (17,18,19,21,22) PHASE IV & V				
60.400.661	L-84996	Mods. to E-Sects. 1 and 15	490-PG(S)	$ 1,080.00
60.400.331	NAS1-3899-T38	Timers, ESRO	871-F	24,247.00
60.400.542	NAS1-3899-T40-1(c1)	5 E-Sec. Flt.Sep.Sys. & Adps.	490-PF(S)	317.00
01.030.020	NAS1-3899-T40(157)	DOD Plant Support (DCASO)	497-SF(D)	5,200.00
01.030.020	NAS1-3899-T40(157)	DOD Plant Support (DCASO)	490-PF(D)	375.00
60.400.334	NAS1-3899-T40	5 E-Sections	490-PF(S)	54,692.00
60.400.422	NAS1-3899-T40	5 E-Sections Completed	490-PF(S)	33,081.00
60.400.774	NAS1-6935-T6	Mods. to 3 E-Sections	490-PH(S)	1,440.00
		SOLRAD, ESRO, GRS-A1 & TIMERS SUBTOTAL		$120,432.00
6 AIR FORCE (OV3-1-6)(7-11 and 20)				
60.400.485	NAS1-5592-1	6 E-Section Sep. Systems	490-RF(S)	$157,715.00
		AIR FORCE SUBTOTAL		$157,715.00
1 ADIE-C (16)				
60.400.544	NAS1-5592-1	E-Section Sep. System	490-PF(S)	$ 16,055.00
60.400.847	NAS1-5592	E-Sect. Mods., Push-off Ring	490-PH(S)	360.00
60.400.774	NAS1-6935-T6	Mods to E-Section	490-PH(S)	2,400.00
60.400.758	NAS1-6935-T7	Mods. to 3 E-Sect. Sep. Sys.	490-PH(S)	6,000.00
60.400.786	NAS1-6935-T7	Mods. to 1 E-Sect. Sep. Sys.	490-PH(S)	2,013.00
		ADIE SUBTOTAL		$ 26,828.00
(6) UK-4, SOLRAD-C, CAS-A, PET-A, OFO-A, ESRO-IB (30,31,34-37) PHASE V (8) TEST (24-29, 32 & 33)				
60.400.752	NAS1-6935-11	6 Test,4 Flt.E-Sect.Sep.Sys.	497-SH(P)	$ 65,000.00
60.400.808	NAS1-6935-11	4 Test E-Sects., 12 Timers	497-SH(P)	90,144.00
60.900.071	NAS1-6935-48	E-Sect. Marman Clamps; UK-4 Payload Bumper Rings	490-PJ(M)	11,430.00

TABLE CCXIV Concluded - SCOUT "E" SECTION PROCUREMENT.

P.R. NO.	CONTRACT	ITEM	FUNDS	AMOUNT
(6) UK-4, SOLRAD-C, CAS-A, PET-A, OFO-A, ESRO-IB (30,31,34-37) PHASE V Continued (8) TEST (24-29, 32 & 33)				
60.400.846	NAS1-6935-11-3(cl)	Modification of E-Section	490-PH(S)	$ 1,000.00
60.400.903	NAS1-6935-11-3(cl)	Push-off Ring Mods.	490-PI(S)	670.00
60.400.891	NAS1-6935-11-4(M2)	Mods to Payload Sep. Timers	490-PI(M)	26,510.00
60.400.808	NAS1-6935-11-6	Deletion Harness E-Section	490-PJ(M)	-449.00
60.900.004	NAS1-6935-11-7(M5)	Convert 2 Test to Flt.E-Sec.	490-PJ(P)	2,881.00
60.400.908	NAS1-6935-11-7	DITTO, SN36	490-PJ(M)	1,805.00
60.900.045	NAS1-6935-45	DITTO, SN31	490-PJ(M)	4,000.00
60.900.049	NAS1-6935-45	DITTO	490-PJ(M)	4,000.00
60.900.074	NAS1-6935-45	DITTO	490-PJ(M)	7,400.00
60.400.094	NAS1-6935-51	E-Sect. Test Rework, UK-4	490-PK(M)	8,490.00
60.400.096	NAS1-7256	Ship E-Sec. SN27 to Holland	490-PJ(M)	73.65
		SUBTOTAL		$222,954.65
		TOTAL		$1,276,146.22

APPENDIXES

APPENDIX A

SAN MARCO PROGRAM

PRECEDING PAGE BLANK NOT FILMED

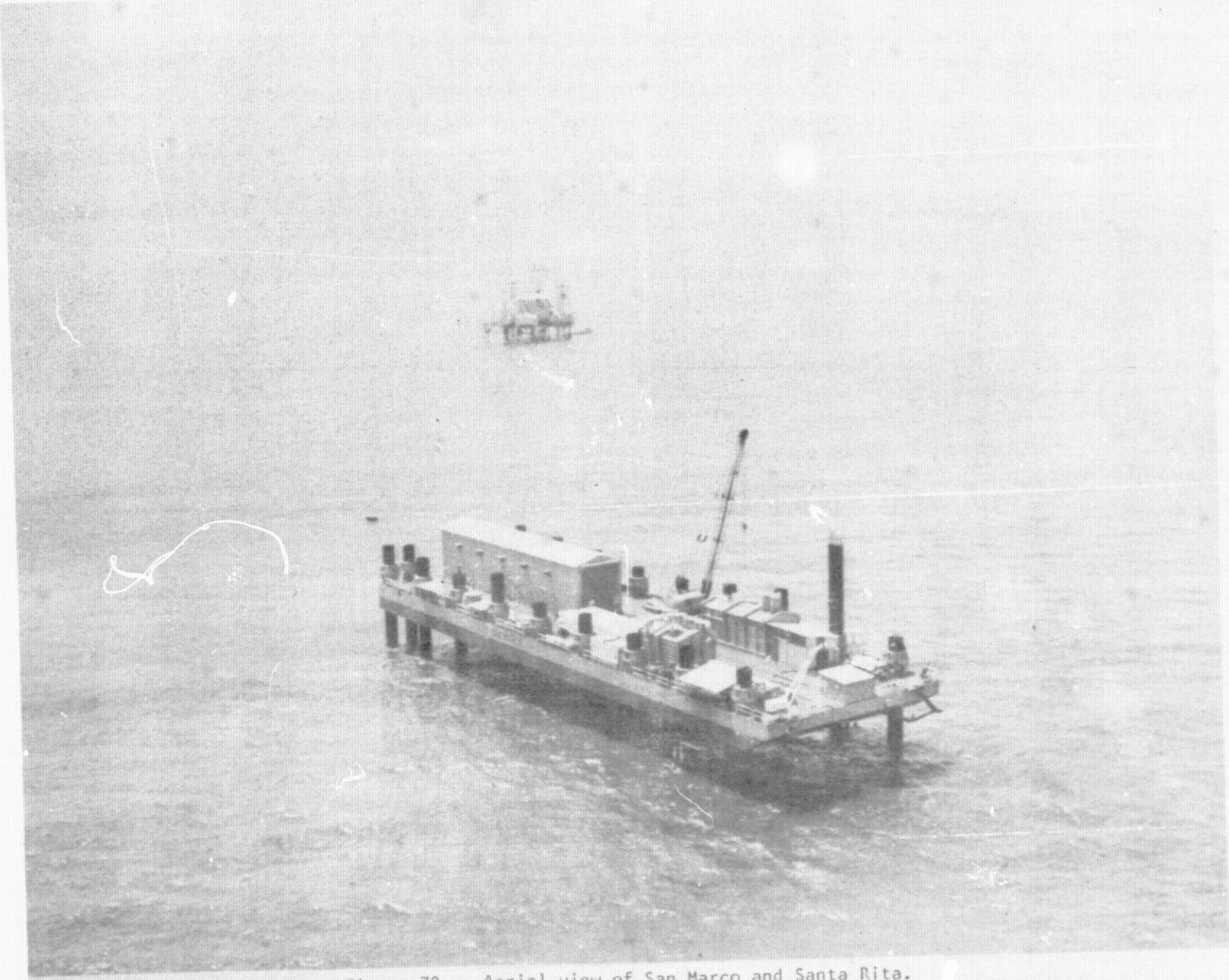


Figure 70.- Aerial view of San Marco and Santa Rita.

APPENDIX A

The San Marco Equatorial Mobile Range, a fully equipped operational range, was established in Formosa Bay of the Indian Ocean off the east coast of Kenya, Africa, for the purpose of placing small to medium sized satellites in orbits about the equator. The establishment of the range was accomplished through a joint and cooperative project, the San Marco Project, undertaken in 1962 by the Italian Space Commission of the National Council of Research and the United States National Aeronautics and Space Administration. The responsibility for the development and operation of the range was given to the Centro Ricerche Aerospaziali of the University of Rome. Figure 70 is an aerial view of the platforms.

To meet the objectives of the San Marco Project, activities were implemented which would train spacecraft engineers and range operational personnel, develop and test scientific spacecrafts, and acquire and activate the range. The objectives were achieved with the launching of the San Marco B spacecraft on April 26, 1967; successfully placing the first satellite into equatorial orbit and establishing the range as a complete operational launch facility.

The original San Marco Program was established by the memorandum of understanding dated May 31, 1962 (exhibit I) between the Italian Space Commission (ISC) and the National Aeronautics and Space Administration (NASA) was successfully concluded April 1967. Plans were formulated for the continuation of this program with the launching of additional satellites aboard Scout vehicles from the San Marco launch range. Several U.S. satellites for an equatorial launching were programed and the San Marco C satellite required the development and integration of U.S. experiments on board an Italian satellite. A new memorandum of understanding was signed March 13, 1970 (exhibit II).

NASA Headquarters, Code SV, continued to direct the program efforts required to support the San Marco launch capability, in fulfillment of NASA operational requirements which are mutually established by the ISC and the NASA. These efforts included provision of launch vehicles and support of range efforts required for joint NASA and ISC operations. Langley Research Center was requested to continue to provide Scout launch vehicles, technical information, and consultation for maintenance and operation of Scout system equipment, on-site technical support, and training of Italian personnel as required. Wallops Station was requested to continue providing technical consultation, data and training for the maintenance and operation of the San Marco range complex. Goddard Space Flight Center was requested to continue providing tracking, data acquisition, communication services as mutually agreed to by NASA and the ISC, including technical consultation and provision of data as required in this area. Additional responsibilities required for the support of the San Marco launch facilities were assigned to Langley Research Center.

The Italian Space Commission and the United States National Aeronautics and Space Administration entered into a second cooperative satellite

project, San Marco C, in November 1967. The San Marco C spacecraft was placed in equatorial orbit on April 24, 1971.

On August 21, 1970, the U.S. National Aeronautics and Space Administration contracted the University of Rome to provide launch services at the San Marco Equatorial Mobile Range. Under terms of the contract, the Centro Ricerche Aerospaziali would launch three NASA Small Astronomy Satellites (SAS-A, B, and C) and one NASA Small Scientific Satellite (SSS-A).

The NASA spacecraft SAS-A was placed in equatorial orbit on December 12, 1970; the first time that a United States satellite had been launched by another nation.

The San Marco Equatorial Mobile Range is available for use by any nation or group of nations interested in conducting peaceful scientific investigations of space and the upper atmosphere for peaceful purposes and within the framework of international cooperation.

The purpose of this appendix is to document the historical events of the San Marco Project and the development of the San Marco Equatorial Mobile Range.

Scientific space research for the United States is the responsibility of the National Aeronautics and Space Administration (NASA). The authority for NASA's international activities rests in Public Law 85-568 (Section 102 (C)) of July 29, 1958, which states that:

> "The aeronautical and space activities of the United States shall be conducted so as to contribute materially to. . ."
>
> "(7) Cooperation by United States with other nations and groups of nations in work done pursuant to this act and in the peaceful application of the results thereof . . ."

NASA's international activities are planned to provide opportunities for the participation of scientists and agencies of other countries in the task of increasing man's understanding and use of his spatial environment. The activities follow guidelines which establish a basis for sound programs of mutual value and contribute to the objectives of international cooperation.

Scientific space research for Italy is the responsibility of the Italian Space Commission of the National Council of Research. The development of scientific satellites and their launching is the prime responsibility of the Centro Ricerche Aerospaziali (CRA) of the University of Rome, a specialized laboratory in the field of aerospace research and technology.

Professor Luigi Broglio was the chairman of the Italian Space Commission and Director of the CRA during the inception and development of the San Marco Project. He remains the Director of the CRA.

In October 1961 a group from the Italian Space Commission presented the San Marco Project proposal to the United States National Aeronautics and Space Administration at Langley Research Center Headquarters.

In a report prepared by the University of Rome describing the San Marco Project, the objective of the project was stated as follows:

> "The project San Marco will be performed under the cooperation between the NASA and the Italian Space Committee, and it will have as objective the launching of a scientific satellite in an equatorial orbit by means of a Scout vehicle launched from a mobile base consisting of two floating platforms with movable legs."

The proposed project actually encompassed two objectives; a short range scientific objective and a long range operational objective with goals in future space work. The scientific objective was to obtain information on the atmosphere in the equatorial region, 200 to 300 Km high.

The operational objective was to establish a launch capability in an equatorial area for launching small to medium sized payloads. The new launch test facility would be available to any nation or group of nations interested in space research and exploration for peaceful purposes.

The San Marco Project was formalized on May 31, 1962, with the signing of a memorandum of understanding by the Italian Space Commission and the United States National Aeronautics and Space Administration providing for a joint and cooperative project. The memorandum (exhibit I) defined the goals and constraints of the project and the commitments of the cooperating agencies. The project consisted of three parts:

Part I

- Train Italian space engineers.
- Train launch and range safety crews for Shotput vehicle.
- Flight test the principal elements of the scientific payload utilizing Shotput vehicle launched from Wallops Island and/or from an Italian platform located near the equator.
- Begin initial design of the equatorial launch complex.

Part II

- Train launch teams for Scout vehicle assembly, check out and launch, and range operations.
- Place a prototype of the ultimate satellite in orbit utilizing a Scout booster launched from Wallops Island.

Part III

- Place the proposed payload into equatorial orbit utilizing a Scout booster launched from a platform located in equatorial waters.
- Establish a fully qualified operational launch test facility.

The Italian Space Commission was to provide the range equipped with a Scout launch complex, the launch crew, and the scientific satellite. The National Aeronautics and Space Administration was to provide the Scout launch vehicle, the training services for the Italian launch crew and the tracking network.

The memorandum of understanding was confirmed by an official agreement between Italian Foreign Minister, Pietro Piccioni and Vice President Lyndon B. Johnson dated September 5, 1962 (exhibit III).

Thus, with a plan, a memorandum of understanding with the United States and a few determined scientists the first complete space program undertaken by the Italians began to materialize. To meet the objectives of the project, activities were implemented along three lines with the activities extending across the United States and Italy to the East Coast of Africa.

Sufficient qualified personnel were not available to man such a complex and widely diversified undertaking; and because of this, the most important line of development concentrated on the training of personnel.

Another line of development entailed the spacecraft and its design, manufacture, and flight qualification.

The third and perhaps most complicated line of development encompassed the acquisition and activation of a launch test facility with its launch complex and support facilities.

The training programs for the CRA personnel included both formal classroom presentations and on-the-job training.

The training presented by Goddard, Langley, and Wallops Station encompassed a large amount of organization philosophy and operational

methodology rather than pure technical training as the CRA personnel possessed excellent technical backgrounds. Training was not accomplished through formal classroom presentations to a prescribed curriculum. Instead the CRA engineers were integrated into the existing organizations working directly with their counterparts. Due to the nature and type training presented at these locations, training records were not documented.

Training was conducted by LTV Aerospace Corporation, Vought Missiles and Space Company - Texas at its Dallas facility between August 19, 1963, and October 11, 1963. Approximately 35 members of the CRA were trained in the operational requirements of processing and launching a Scout vehicle. The training included 3 weeks of formal classroom work in the function and operation of the systems of the Scout vehicle and 5 weeks of on-the-job training with vehicle S-137 in the areas of factory manufacturing, quality control, vehicle processing, and prelaunch checkout.

Subsequent to the training at the factory, field operational training was scheduled to be conducted by Vought Missiles and Space Company, Wallop Island field personnel, at Wallops Island. Unfortunately, this field training effort did not materialize as scheduled. The Scout vehicle was undergoing a series of design improvements which prevented vehicles from being delivered and processed in the field. In addition, range facilities and requirements had not been resolved. However, in spite of these conditions, some training was accomplished through informal lectures, shop demonstrations, observation, and on-the-job training.

A new training plan was prepared and a formal field operational training program was implemented August 1, 1964. Advantage was taken of every opportunity for training and available hardware was utilized to the fullest extent possible. CRA personnel participated by observation or personal performance in almost every phase of the receipt-through-launch cycle of five Scout vehicles at Wallops Island.

Vehicle S-137R could conceivably be called the final examination of the San Marco Training program. A team of Vought Missiles and Space Company - Wallops Island personnel was formed to monitor and assess the CRA performance. The vehicle arrived at Wallops Island on November 3, 1964, and was successfully launched December 15, 1964. This launch was an all-Italian endeavor and gave Italy the distinction of becoming the third nation to place a satellite in orbit following Russia and the United States. For the record, Great Britain and France had satellites in orbit, but they had been placed there by United States launch teams.

The experiments and flight qualification for test spacecrafts were designed and fabricated in Rome by CRA personnel. Launch operations with the first flight unit were initiated early in 1963. The first unit was mated with the second stage of Shotput 6 vehicle at Langley and delivered to Wallops Island in April for final spin balancing. Shotput 6 vehicle

was launched from Wallops Island April 21, 1963. All spacecraft systems functioned properly except for the yo-yo despin system. This system failed to reduce the spin rate as required in order to make atmospheric measurements with the drag balance experiment. The flight was considered a success despite the failure as valuable data were obtained from the associated subsystems.

Improvements were incorporated into the second flight unit by CRA personnel and Shotput 7 vehicle with flight unit 2 on board was successfully launched from Wallops Island August 2, 1963.

The San Marco B spacecraft was also designed and fabricated by CRA personnel at Rome. The basic design of the San Marco B was the same as San Marco A with improvements in operation and reliability. Two spacecraft were fabricated; a primary flight unit and a back-up unit.

Integration and environmental tests were conducted in Italy at the CRA facilities on both the flight unit and the back-up unit. The back-up unit was shipped to Vought Missiles and Space Company at Dallas, Texas, in 1966 where a mechanical fit check with the Scout vehicle and radio-frequency-interference tests were conducted. As with the earlier spacecraft, STADAN compatibility tests were conducted at Blossom Point on the Eastern shore of Maryland during 1966 using the back-up unit.

Dynamic balancing of the spacecraft/Scout fourth-stage combination posed a problem. In the past in Scout vehicle processing, the spacecraft/fourth-stage assembly was dynamically balanced at the launch site and then mated as an assembly with the rest of the Scout vehicle at the launch emplacement. With the San Marco B spacecraft, things were not quite so simple because the spacecraft was in Italy, the spin facilities were in the United States and the launch site was off the east coast of Africa. To follow the established routine would have added 8,000 miles of transportation to the spacecraft and would have created a difficult shipping situation for the spacecraft/fourth-stage assembly. Based on the Scout fourth-stage interchangeability study which had just recently been completed, the decision was made to balance the spacecraft and the fourth stage separately, ship them to the range, and then assemble them. As a result, the spacecrafts were balanced in Rome, the fourth stage was balanced at Wallops Island and the mating of the flight spacecraft with the fourth stage was performed aboard the San Marco platform at the range. The flight spacecraft and the back-up were shipped in March 1967 from Rome through Nairobi to Malindi by commercial air where they were moved by motor truck to Base Camp and to the platform by motor launch.

The San Marco B spacecraft was successfully launched with Scout vehicle S-153C on April 26, 1967, to become the first satellite to be placed in equatorial orbit. All systems performed normally from launch until mid-August 1967 when the loss of power supply voltage prevented

further command of the satellite. Re-entry occurred on October 14, 1967, during orbit 2,680. The satellite had been in orbit for 171 days.

Since the launching of San Marco B spacecraft, development has continued on other spacecraft for launches from the San Marco Range. The San Marco C spacecraft was launched in April of 1971.

The major milestones for San Marco are listed in table CCXV.

Figure 71 illustrates Launch Site Layout in Formosa Bay.

Chapter I of the San Marco Users Manual is reproduced to describe range capability (shown in exhibit IV).

Figures 72 through 80 illustrate the San Marco range.

TABLE CCXV - SAN MARCO MAJOR MILESTONES

1961	
October	Group from Italian Space Commission visited Langley Research Center.
1962	
May 31	Signing of the memorandum of understanding.
September 17-21	First working group meeting, Washington, DC.
September 24	First CRA personnel arrive LRC to work on Shotput.
November 30	Began Environmental Study for Range concept.
1963	
April 20	First Shotput (No. 6) launched from Wallops Island.
August 2	Second Shotput (No. 7) launched from Wallops Island.
August 19 - October 11	Training at Vought Missiles and Space Company - Texas for CRA personnel.
December 21	Started towing operations of Santa Rita platform from Italy enroute to Africa.
1964	
January 29	Santa Rita platform arrived in Africa.
March 1	Santa Rita platform positioned in Formosa Bay.
March 25 - April 2	Nike-Apache launches from Santa Rita platform.
	Santa Rita platform returned to Mombasa.

TABLE CCXV Continued - SAN MARCO MAJOR MILESTONES

1964 Cont'd

December 15	San Marco A launched from Wallops Island by CRA launch team.
March 3	Negotiations completed to build a Mark II launcher.

1965

May 30	San Marco platform departed Charleston, South Carolina, USA, towed by Italian tug to La Spezia, Italy.
September 13	Satellite SM-1 decayed from orbit.

1966

February 18	Launcher shipped from Houston, Texas, to La Spezia, Italy.
March 25	San Marco platform departed La Spezia for Mombasa.
May 15	S^3T equipment shipped from Wallops Island.
July 18	Blockhouse equipment shipped from Rome, Italy.
August 28	All equipment vans installed on Santa Rita.
November 10	Moved San Marco platform to Formosa Bay.
November 26	Moved Santa Rita to Formosa Bay.
December 10	Base Camp operational.
December 16	Power generators installed on platform.
December 20	First underwater cable installed between platforms.

1967

January 17	Underwater cable installation and termination complete (21 cables).
January 22	Propulsion system for vehicle S-153 departed USA for San Marco platform.
February 16	Blockhouse validation completed.
February 27	Mock countdown completed with vehicle S-144.
March 2	S-153 propulsion system arrived at Formosa Bay.
March 4	Completed mock countdown with vehicle S-144 using live pyrotechnics.
March 10	Started processing vehicle S-153.
April 26	Launched San Marco B on Scout vehicle S-153 from San Marco Range.
November 18	Signing of the second memorandum of understanding for San Marco C.
November 20-22	Working Group Meeting in Washington on San Marco C.

TABLE CCXV Continued - SAN MARCO MAJOR MILESTONES

1968

March 25	Performed checkout of the Launch Complex equipment.
May 21	San Marco C Working Group Meeting in Washington.
August 19	Negotiated first phase of an Italian manufacturing program.
November 4-25	Range inspected for general condition. SAS-A personnel given an introductory tour of range.
December 8	Published the Range User's Manual.
December 21	Published a Shipping Procedure document for potential range users.

1969

January 13-17	SAS and SSS Working Group Meeting in Washington to review range requirements.
January 21 - February 10	CCA Representative reviewed the Command Destruct Transmitters.
March 19	San Marco Working Group Meeting in Washington.
April 7-19	Le Tourneau personnel conducted structural survey of the Santa Rita platform.
April 9	Working Group Meeting in Rome.
April 23- June 11	CRA personnel refresher training program at Wallops Island.
July 1-18	Range inspected and Working Group Meeting in Rome.
September 23-24	Working Group Meeting in Washington. Spacecraft/ Range Meeting at GSFC.
November 17	Began range safety refresher training at Wallops Island for CRA personnel.

1970

January 12	Completed safety refresher training at Wallops Island for CRA personnel.
February 6-15	Inspected range.
March 11	Completed validation of range systems.
May 6-8	Negotiated Launch Service Contract for NASA launches.
May 22	Started rework of range H_2O_2 system.
June 5-20	San Marco Working Group Meeting and Range Readiness Review for spacecraft.
September 3	MPS-26 Radar System departed New York on Hellenic Lines "SS African Dawn."
September 12	Vehicle S-175C propulsion system departed NAD, Earle, New Jersey, on Hellenic Lines "SS Hellenic Laurel."

TABLE CCXV Concluded - SAN MARCO MAJOR MILESTONES

1970 Cont'd

September 18	Vehicle S-175C assemblies shipped from Dallas, Texas, via commercial air; arriving in Nairobi September 21.
October 9-10	"Hellenic Laurel" anchored in Formosa Bay at 2100 hours on October 9. Motors transferred to San Marco platform on October 10.
October 7	"African Dawn" arrived at Mombasa and transferred MPS-26 radar van to a lighter.
October 9	The lighter with radar van arrived at Base Camp.
October 13	MPS-26 radar van transferred to auxiliary platform.
November 10	SAS-A spacecraft arrived at Base Camp.
November 21	Radar and telemetry systems checked out using a light aircraft.
November 23	System Tests completed on Vehicle S-175C.
December 2	SAS-A spacecraft installed on booster vehicle.
December 8	Completed Dress Rehearsal.
December 12	SAS-A spacecraft placed in equatorial orbit with Scout vehicle S-175C.

1971

February 10	Vehicle S-173C propulsion system departed NAD Earle, New Jersey, aboard the Barber Lines "SS Tortugas."
February 27	Vehicle S-173C assemblies shipped by commercial air from Dallas, Texas, via New York and Frankfurt, arrived in Nairobi on March 1.
March 7-8	"SS Tortugas" anchored in Formosa Bay on the 7th and the propulsion system was off-loaded on March 8.
April 2	Vehicle S-163C propulsion system departed NAD Earle, New Jersey, aboard the Barber Lines "SS Tennessee."
April 5	All Systems Test with vehicle S-173C completed.
April 14	San Marco C payload installed on vehicle.
April 21	Mock Countdown conducted with Scout vehicle S-173C and San Marco C payload.
April 24	Scout S-173C launched at 7:32 hours Zulu successfully placing San Marco C spacecraft in equatorial orbit.
April 28	"SS Tennessee" arrived in Formosa Bay and off-loaded propulsion system.

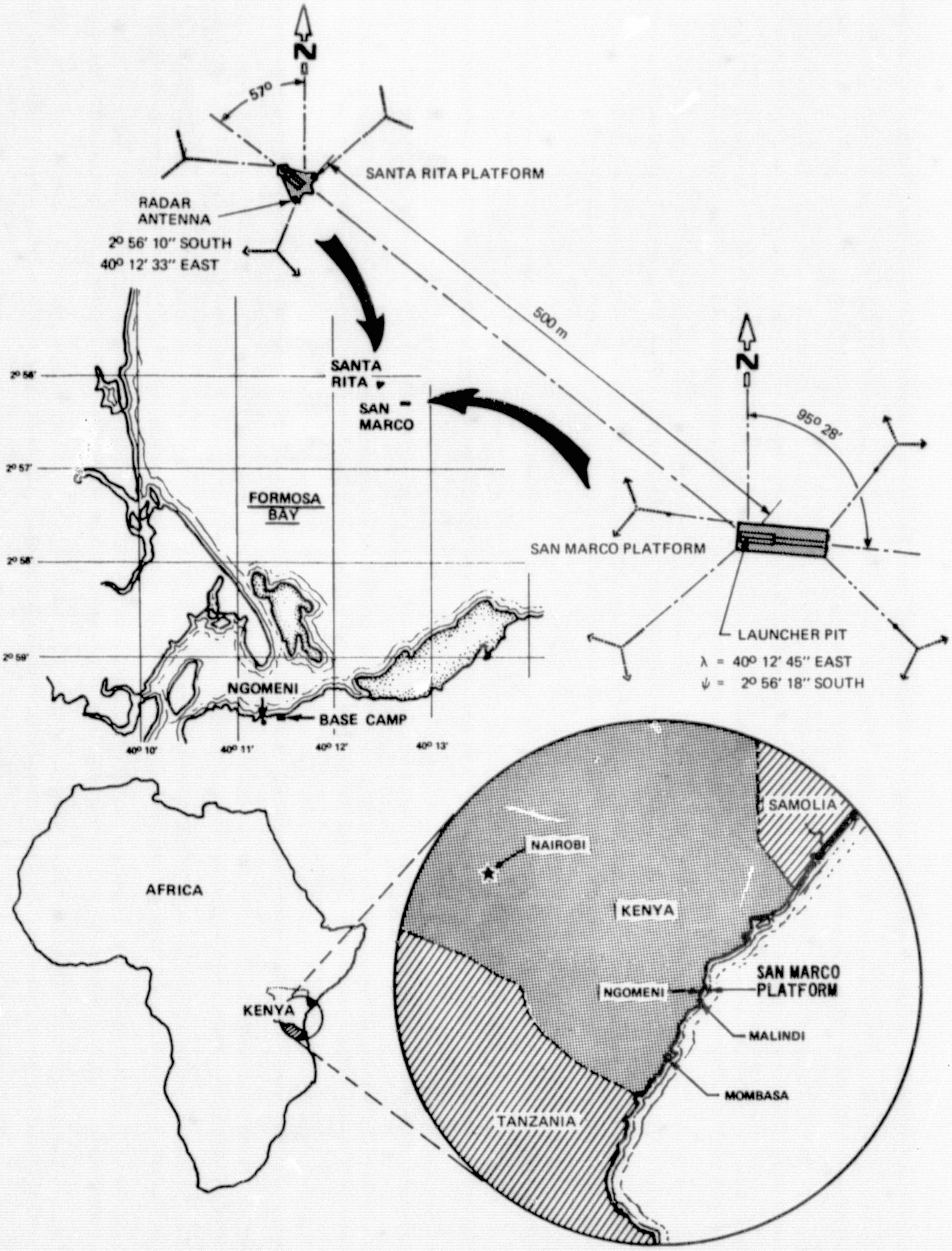
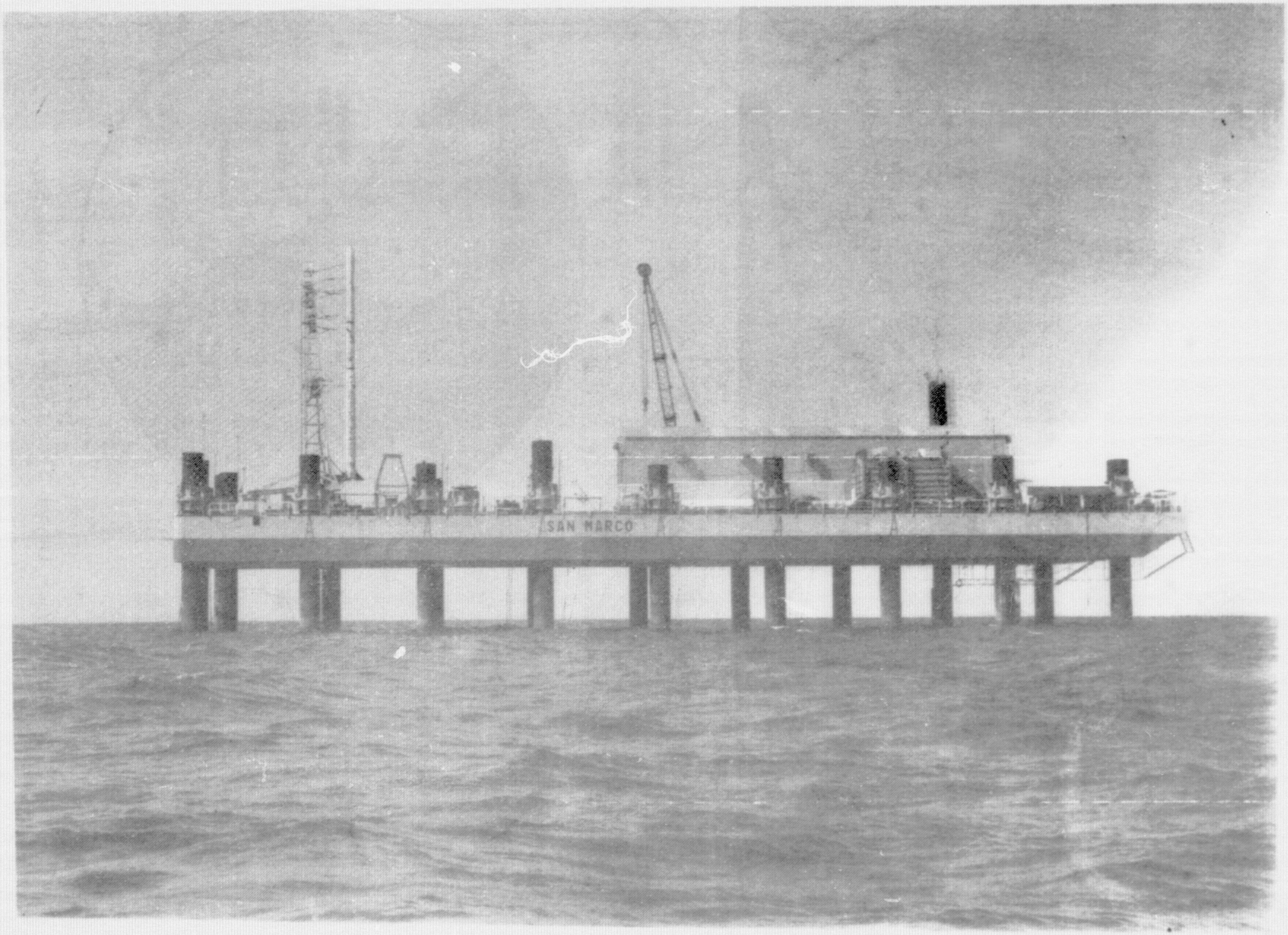


Figure 71.- Launch Site Layout in Formosa Bay.


SAN MARCO

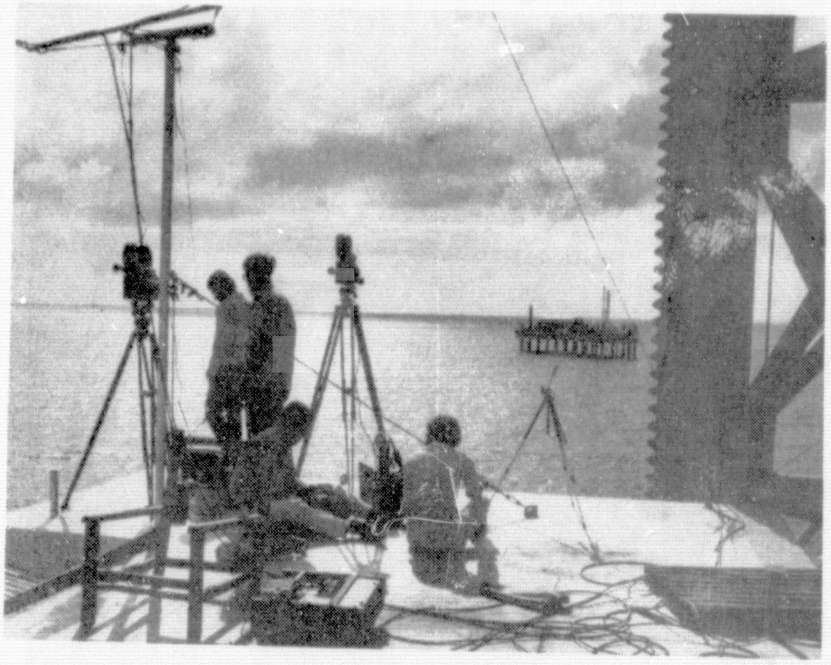


Figure 73.- San Marco as seen from Santa Rita Platform.

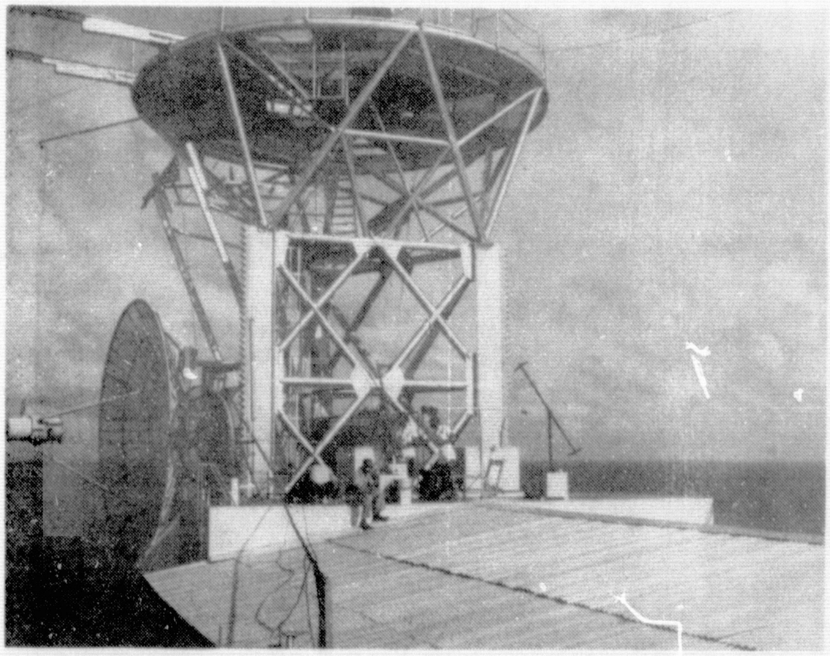


Figure 74.- Santa Rita Radar.

Figure 75 (a).- San Marco Base Camp.

Figure 75 (b).- San Marco Base Camp.

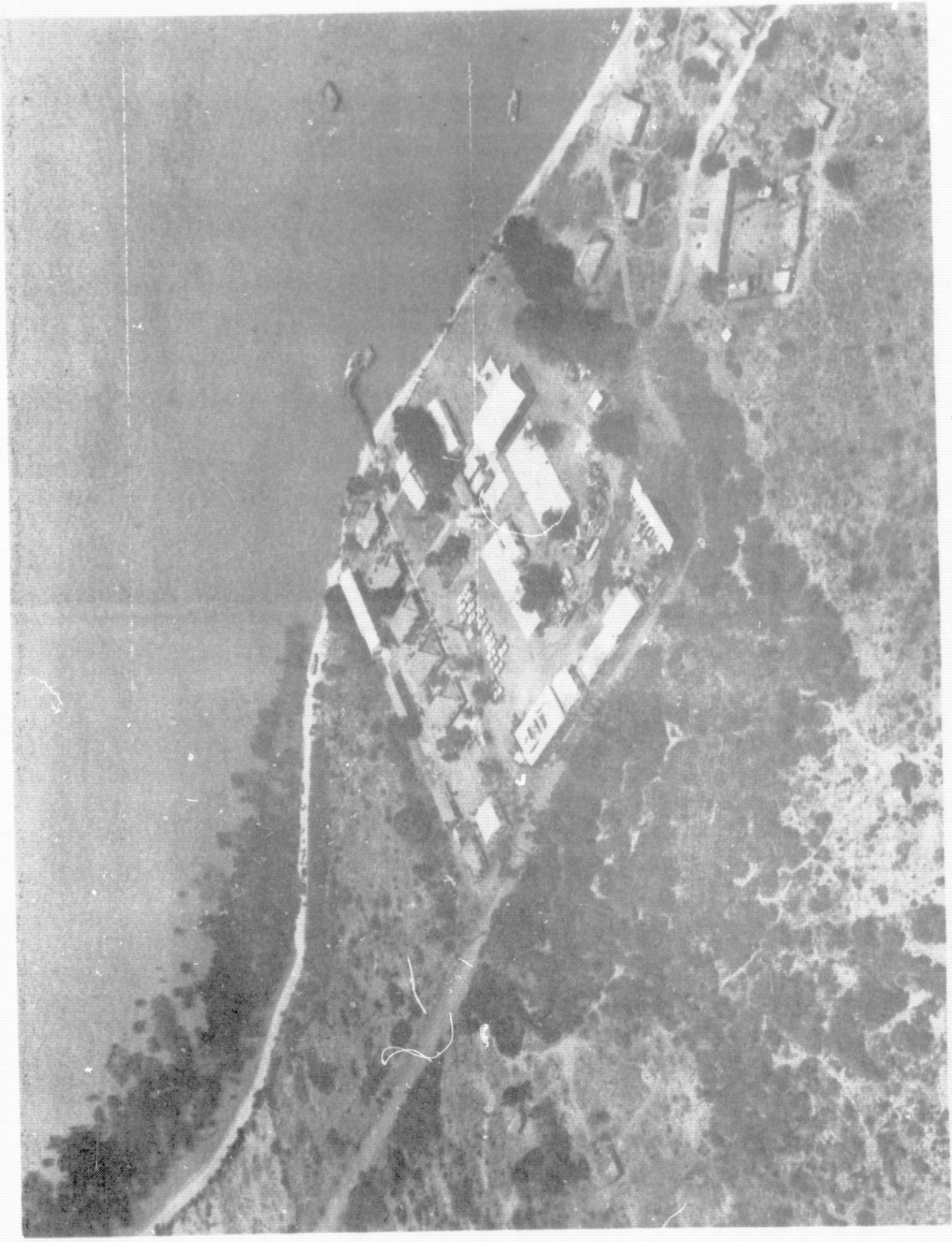


Figure 76.- Aerial view of San Marco Base Camp.

Figure 77.- Base Camp Tracking.

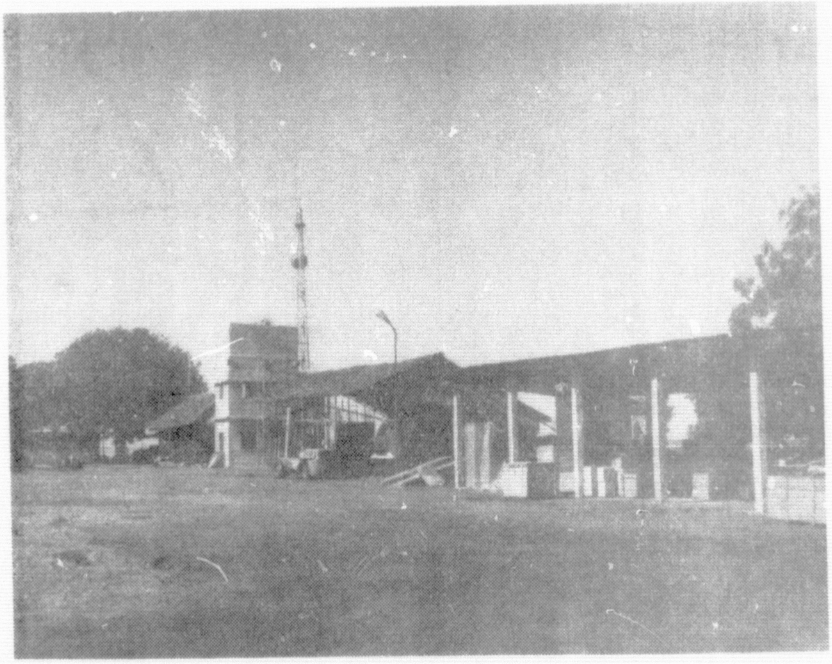


Figure 78.- San Marco Base Camp.

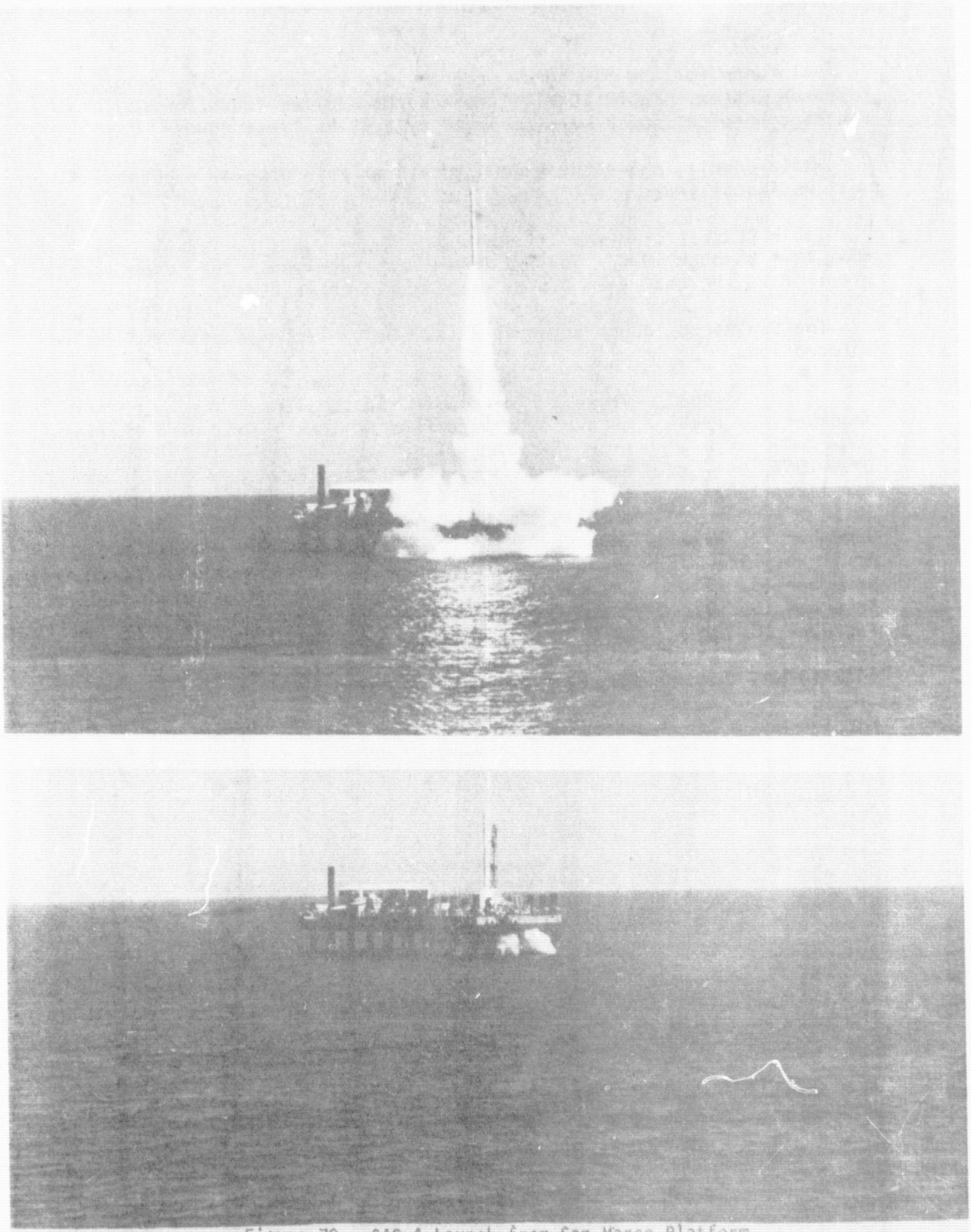


Figure 79.- SAS-A Launch from San Marco Platform.

All funds for the San Marco program were assigned to the Langley Research Center. Table CCXVI itemizes the Italian funds for the San Marco project which were received by LaRC as Trust Funds.

Table CCXVII shows the expenditures for this program by Phases as well as fiscal years.

Table CCXVIII itemizes all San Marco Trust Funds by fiscal year from 1963 through 1970. No 1971 funds were received. The funds were allotted to the LaRC from OSS as itemized in table CCXIX.

The San Marco launch schedule listed below includes past and future information.

1963	Begin training with the Italians.
December 15, 1964	Launch San Marco from Wallops Island with Italian crew (S-137R).
1964-1967	Build San Marco Launch Complex.
April 26, 1967	Launched San Marco satellite from San Marco Range on S-153C.
December 12, 1970	Launched SAS-A from San Marco Range on S-175.
April 24, 1971	Launched SM-B from San Marco Range on S-173.
November 15, 1971	Launched SSS-A from San Marco on S-163CR.
November 16, 1972	SAS-B from San Marco on S-170CR.
February 18, 1974	SM-C from San Marco on S-190C.
Late 1974	UK-5 from San Marco on S-187C.
Late 1975	SAS-E from San Marco on S-194C.

The San Marco Range has a 100 percent launch success record.

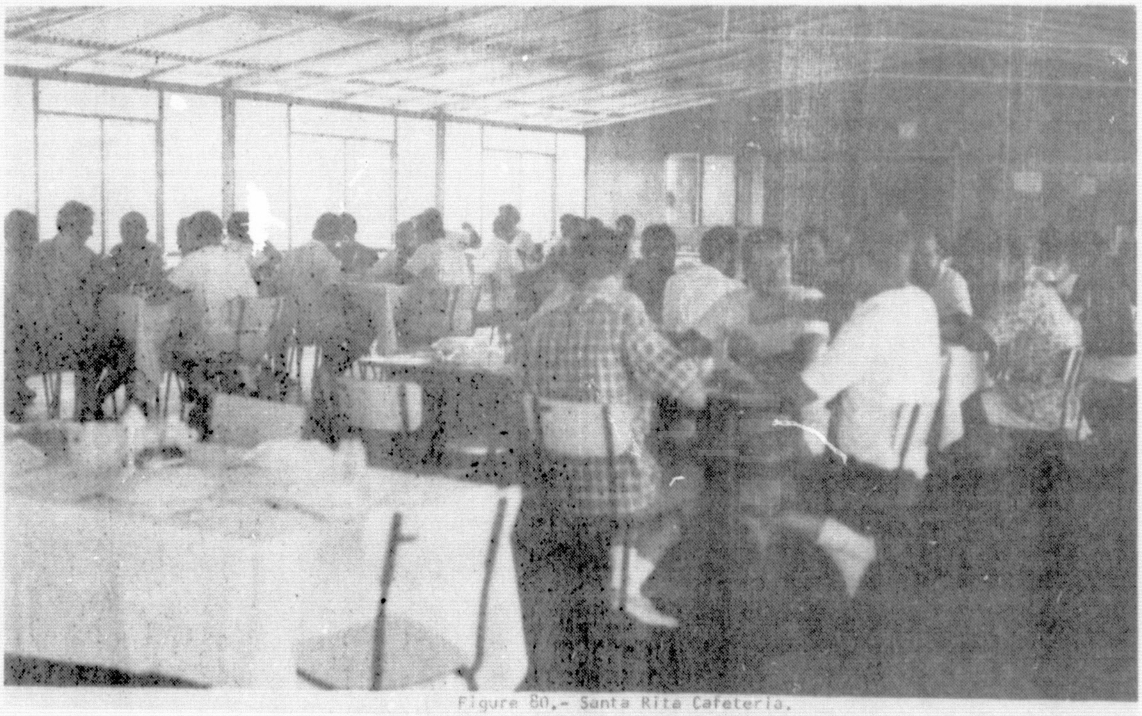


Figure 80.- Santa Rita Cafeteria.

TABLE CCXVI - SAN MARCO TRUST FUNDS.

(Thousands Dollars)

FUNDS	894	490-01	490-02
FY63	$1,875		
FY64	338	$1,100	
FY65	500	600	$ 545
FY66	350	1,000	
FY67	100	300	440
FY68	70	800	
FY69	0	100	116
FY70	0	0	766
FY71	0	0	842
FY72	0	0	766
FY73			
	$3,233	$3,900	$3,475
3 Vehicles (490)-01	$3,841		
TOTAL	$7,074		

EXPENDITURES

Phase I	Shotput	$ 685
Phase II	GSE and Sustaining Engineering, etc.	1,768
Phase II	Wallops Vehicle (S-137)	1,100
Phase II	DCASO	13
Phase II	Technical Support	68
Phase IV	Technical Support	260
Phase IV	Equatorial Vehicle (S-153)	1,100
Phase III	Vehicle Checkout and Recertify (S-144)	500
Phase IV	GSE and DCASO	54
Phase IV	Sustaining Engineering, etc.	440
Phase IV	Goddard Subauthorization	30
Phase V	Equatorial Vehicle (S-173) Complete	2,100
Phase V	Launch Site	200
	TOTAL	$8,318

TABLE CCXVII - SAN MARCO EXPENDITURES.

	FY 1963	FY 1964	FY 1965	FY 1966	FY 1967	FY 1968	TOTAL
*PHASE I							
Hardware	$ 104,001.42	$ 0	$ 0	$ 0	$ 0	$ 0	$ 104,001.42
Instrumentation	79,890.12	0	0	0	0	0	79,890.12
Motors	275,871.16	2,063.85	0	0	0	0	277,935.01
Ground Support Equipment	19,920.70	5,272.72	0	0	0	0	25,193.42
SUBALLOTMENT							
Goddard	53,566.79	62,730.14	0	0	0	0	116,296.93
Wallops	37,973.94	0	0	0	0	0	37,973.94
PHASE I SUBTOTAL	$ 571,224.13	$ 70,066.71	$ 0	$ 0	$ 0	$ 0	$ 641,290.84
*PHASE II (SAN MARCO A)							
Support	$1,222,516.49	$155,877.31	$ 99,780.95	$ 74,921.55	$ 0	$ 0	$1,553,096.30
Vehicles	0	10,509.00	0	0	0	0	10,509.00
SUBALLOTMENT							
Western Operations	0	24,841.58	0	0	0	0	24,841.58
PHASE II SUBTOTAL	$1,222,516.49	$191,227.89	$ 99,780.95	$ 74,921.55	$ 0	$ 0	$1,588,446.88
*PHASE III (SAN MARCO B)							
Support	$ 0	$ 6,297.11	$ 0	$ 0	$ 0	$ 0	$ 6,297.11
SUBALLOTMENT							
Goddard	0	62,935.42	0	0	23,898.00	0	86,833.42
PHASE III SUBTOTAL	$ 0	$ 69,232.53	$ 0	$ 0	$ 23,898.00	$ 0	$ 93,130.53
*PHASE IV (SAN MARCO C)							
Support	$ 416.10	$ 0	$400,219.05	$263,254.94	$ 30,235.29	$ 0	$ 694,125.38
PHASE IV SUBTOTAL	$ 416.10	$ 0	$400,219.05	$263,254.94	$ 30,235.29	$ 0	$ 694,125.38
*Phase V (SAN MARCO C)							
Support	$ 71,759.00	$ 7,206.00	$ 0	$ 11,823.51	$ 45,866.71	$ 70,000.00	$ 206,550.22
PHASE V SUBTOTAL	$ 71,759.00	$ 7,206.00	$ 0	$ 11,823.51	$ 45,866.71	$ 70,000.00	$ 206,550.22
SAN MARCO TOTAL	$1,865,915.72	$337,733.13	$500,000.00	$350,000.00	$100,000.00	$ 70,000.00	$3,223,648.85

---

*Not related to Scout Phases I, II, III, IV, or V.

TABLE CCXVIII CORRECT DESIGNATION:

Pages 629 through 638 - San Marco U.S. Funds

Pages 639 through 645 - San Marco Trust Funds

TABLE CCXVIII- SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE I (RAS 112)		1963	
HARDWARE			
20.200.041	L-7080-30	Screws	$ 4.88
P01327	L-14698	Plastic Rod	33.00
P01326	L-14721	Magnesium Plant	646.84
P03178	L-15217	Screws	10.29
P05035	L-17356	Webbing	222.21
P05036	L-17455	Squib Switches	264.50
P08455	L-20784	Rivets	113.43
P10529	L-22303	Tubing	22.70
P11-607	L-22638	Gasket Material	34.65
20.200.062	L-25207	Connectors	395.63
20.202.044	L-25696	Connectors	61.00
20.200.046	L-25892	Fittings	119.48
21.200.189	L-27754	Squib Switch	222.00
12.230.016	L-27917	Filters	900.16
20.200.061	L-28605	Titeflex Connector	101.00
51.240.098	L-29031	Shrinkable Tubing	22.70
12.230.097	L-29211	Plugs and Cables	90.20
51.150.046	L-29477	Battery	684.01
20.200.261	L-30018	Deutsch Connectors	143.89
20.200.264	L-30468	Atlas Squib Switch	172.00
12.230.149	L-30480	Silver Cells	509.60
20.230.265	L-30545	Connectors	96.05
12.230.116	L-30791	Vibrometer System	845.00
20.200.263	L-30864	Lugs	15.09
53.130.194	L-30922	Alter Screws	125.00
20.200.260	L-31542	Shock Mountings	774.00
12.230.177	L-31788	Connectors	153.82
12.230.176	L-31797	Connectors	92.79
12.230.214	L-36560	Accelerometer	650.00
P02479	NAS1-2435	Squib Switches	3,000.50
P00781	NAS1-2475	Pollux Fins	60,167.00
P09333	NAS1-2475	Fin Assembly	33,053.00
P09333	NAS1-2475	Fin Assembly	255.00
		HARDWARE SUBTOTAL	$104,001.42

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE I (RAS 112) Continued		1963 Continued	
INSTRUMENTATION			
P10530	L-2203	Cable	$ 20.00
P06289	L-4424	Wire	95.04
P00147	L-13188	Accelerometer & Amp. Sys.	1,690.00
P01007	L-14627	Timer	1,956.50
P00807	L-15132	Switches	198.07
P02220	L-15172	Mixer Amplifier	596.25
P02527	L-15189	Voltage Regulator	1,755.60
P02365	L-15624	Cable	16.62
P02885	L-15796	Converters	1,607.15
P05555	L-16304	Sockets	181.47
P05967	L-16314	Oscilloscope	493.29
P03309	L-16485	Voltmeter	55.30
P04483	L-18078	Connectors	420.24
P06098	L-18437	VHF-FM Telemeter Trans.	1,800.77
P05965	L-18936	Coaxial Attenuator	65.77
P05971	L-18937	2 - Telemetry Display Units	1,390.00
P07061	L-19037	Voltmeter	887.32
P05969	L-19317	Timer	1,256.00
P07087	L-19324	Plugs	1,944.45
P05970	L-19404	Telmetry Receiver	2,495.00
P05964	L-19416	Preamplifier	260.00
P05973	L-20181	Digital Voltmeter	2,482.52
P05960	L-20199	DC-Volt-Ohm Ammeter	406.36
P05962	L-20199	Vacuum Tube Voltmeter	335.95
P05963	L-20616	Audio Oscillator	205.95
P10255	L-21439	Silver Cells	1,137.50
P10250	L-21748	Pressure Transducers	405.88
P10252	L-21756	Mixer-AMP	376.50
P10482	L-21758	Wire	167.90
P10251	L-21760	Timer Meter	195.00
P10254	L-23259	Sensors	2,340.00
P10253	L-25209	Servo-Accel.	1,690.00
20.200.076	L-25441	Timer	362.00
12.230.107	L-29499	Repair Accelerometer	250.00
12.230.148	L-30557	Transmitters	1,802.73
12.230.111	L-30558	Voltage Regulator	440.60
12.230.113	L-30559	Pressure Transducer	189.00
12.230.117	L-30565	Pressure Transducer	405.00
12.230.112	L-30816	D. C. Converters	475.00
12.230.150	L-30816	D. C. Converters	475.00
12.230.119	L-30861	Sensor	1,200.00
12.230.115	L-30877	Subcarrier Oscillator	1,899.00

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE I (RAS 112) Continued		1963 Continued	
INSTRUMENTATION Continued			
12.230.152	L-31118	Tubes	$ 96.88
20.200.078	L-78079	Terminal	13.00
P01663	NAS1-2413	Accelerometers	4,890.00
P02038	NAS1-2424	Oscillators	5,943.30
P02528	NAS1-2444	Magnometers	2,730.00
P05958	NAS1-2575	Tuning Unit	13,188.79
P05972	NAS1-2576	Tele Subcarrier	3,998.27
P10256	NAS1-2824	Transmitter	5,608.00
P10258	NAS1-2833	Sub-car Oscillator	3,785.15
12.230.118	NAS1-3364	Temp. Coeff. Sensitivity	3,210.00
		INSTRUMENTATION SUBTOTAL	$79,890.12
MOTORS			
20.200.188	L-2570-10	X-248 Increase	$ 9,000.00
20.200.185	L-5973	X-248 Increase	7,000.00
P03308	L-15254	Galvanometer	40.97
P02477	L-15445	Dimple Motor	169.15
P02976	L-15837	X-248 Delta Rocket Case	600.00
P04506	L-15973	2 - X-248A5	27,000.00
P12135	L-15973	X-248A5D	17,000.00
20.200.387	L-15973	X-248A5 Increase	1,800.00
P01310	L-15982	XM-33 Motors - Pollux	75,613.00
P06583	L-15982	Castor Price Increase	16,000.00
P10260	L-15982	XM-33-E6	53,200.00
21.200.103	L-15982	XM-33-E6	4,242.00
20.200.229	L-15982	Recasting Pollux	30,000.00
P01310	L-15982-5	Underrun	-4,979.11
P03773	L-17170	Igniter Tester	732.00
P10259	L-20409	Control Rocket Motor	2,079.10
20.200.042	L-24899	Squibs	976.92
20.200.060	L-25433	DuPont-94 Squibs	104.00
21.200.105	L-25435	Galvanometer	50.03
21.200.104	L-25436	Thermolag Repair, HPC-26	244.90
P02-478	NAS 1-2436	Control Rocket Motors	5,299.20
P08110	NAS 1-2626	Inspect XM-33	1,800.00
P08202	NAS 1-2626	Inspect XM-33	2,135.00
P09914	NAS 1-2942	Recruits	17,176.00
P10261	NAS 1-2942	Recruits	8,588.00
		MOTORS SUBTOTAL	$275,871.16

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE I (KAS 112) Continued		1963 Continued	
GROUND SUPPORT EQUIPMENT			
P02681	L-7153	Tools	$ 128.40
P02682	L-7153	Tools	40.50
P02684	L-7193	Thor Drill	120.00
P02661	L-15457	Battery 1.5 v	657.79
P02660	L-15458	Battery 13.9 v	2,044.72
P02680	L-15706	Tools	429.42
P02683	L-15706	Tools	257.60
ADB100	L-15974	Stock Issues	4,587.53
P01974	L-17684	Deutsch Connectors	742.08
P05961	L-18662	Readout Indicator	786.00
P07064	L-18761	Record Paper	609.00
P06608	L-18962	M-H Modu-Mount	552.27
P07063	L-19036	Power Supply - L	345.00
P07065	L-19036	Power Supply - DC	1,430.00
P07062	L-19038	Power Supply - HP	294.20
P06609	L-19054	Cooling Fans	453.66
P05966	L-19417	Scope Mobile Cart	108.66
P07115	L-19573	Sling	122.64
P06740	L-19641	Deutsch Connectors	143.04
P08-787	L-20239	Engraving	258.70
P08454	L-20677	Clinometer	280.00
P09332	L-20793	Shackles	7.45
P10257	L-22563	Vibrometer	1,690.00
P11349	L-22829	Rivets	84.75
P10270	L-24285	Scaffold	162.60
20.200.075	L-25440	Battery	685.67
20.200.086	L-26066	Sling	75.72
20.200.088	L-26066	Sling	115.99
12.230.039	L-26469	Connector Cable	22.58
20.200.082	L-26554	Nico Press	18.63
12.230.055	L-27323	Repair Instruments	259.36
53.510.122	L-27633	Fixture and Mount Drive	1,560.00
55.220.031	L-27831	Stainless Cable	18.50
12.230.082	L-28207	Quick Disconnect	300.12
55.210.066	L-30320	Pressure Relief Valve	68.04
20.200.308	L-31837	Turnbuckle	140.88
20.200.352	L-34748	Puller, 1½ Ton	90.00
20.200.413	L-36425	Shock Mountings	229.20
		GROUND SUPPORT EQUIPMENT SUBTOTAL	$19,920.70

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE I (RAS 112) Continued		1963 Continued	
SUBALLOTMENTS			
Goddard Space Flight Center			$ 53,566.79
Wallops Station			37,973.94
		SUBALLOTMENTS SUBTOTAL	$ 91,540.73
		PHASE I SUBTOTAL	$ 571,224.13
PHASE II (RAS 110) (SAN MARCO A)			
SUPPORT			
P39-005	NAS1-1295-22(c35)	Training Manuals	$ 2,916.00
P39-007	NAS1-1928-4	Study for Texas Tower	142,468.82
20.200.155	NAS1-1928-4-1	Texas Tower Study Incr.	18,279.00
20.200.209	NAS1-1928-2(c1)	Despin Mechanism	8,501.00
20.200.016	NAS1-1928-9	Technical Support	168,064.00
P02583	NAS1-2455	Blockhouse Consoles	859,537.00
20.200.207	NAS1-2455-7	Procedures	9,332.00
P11224	NAS1-2804	Fab. Engnr. Models	10,551.00
60.400.024	NAS1-3899-11	Technical Support	2,867.67
		SUPPORT SUBTOTAL	$1,222,516.49
		PHASE II SUBTOTAL	$1,222,516.49
PHASE IV (SAN MARCO C)			
SUPPORT			
45.110.018	NAS1-2475	DOD Plant Services(DCASO)	$ 224.10
01.030.020	NAS1-3311(227)	DOD Plant Services(DCASO)	192.00
		SUPPORT SUBTOTAL	$ 416.10
		PHASE IV SUBTOTAL	$ 416.10

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO	ORDER NO.	ITEM	OBLIGATION
PHASE V (SAN MARCO C)		1963 Continued	
SUPPORT			
60.400.931	NAS1-10000-J	San Marco Support	$ 71,759.00
		PHASE V SUBTOTAL	$ 71,759.00
		FY 1963 TOTAL	$1,865,915.72
		FY 1964 SAN MARCO EXPENDITURES	
PHASE I (RAS112)			
GROUND SUPPORT EQUIPMENT			
ADB100	L-15974	Stock Issues	$ 3,612.67
20.200.369	L-33765	Proteckto-Sorb. 2 Drums	95.57
51.150.069	L-35122	Relay Sockets	45.00
20.200.389	L-35593	Soldering Iron	57.22
20.200.413	L-36425	Shock Mountings	17.64
20.200.400	L-36486	Specs. for San Marco	22.32
20.200.406	L-36806	Water Tubing	17.80
20.200.458	L-37860	Pressuriz. S.M. P/L in Indian Ocean	50.80
20.200.457	L-38138	Pressuriz. S.M. P/L in Indian Ocean	37.23
20.200.480	L-38807	Safety Straps	47.40
20.200.456	L-39118	Pressurizing S.M. P/L	30.00
20.200.507	L-40678	Deutsch Tools	150.01
20.200.537	L-42155	Relief Valve	42.43
20.200.556	L-42436	Strap	71.10
45.110.011	NAS1-2475	DOD Plant Services (DCASO)	975.53
		GROUND SUPPORT EQUIPMENT SUBTOTAL	$ 5,272.72
MOTORS			
20.200.396	L-15973	X-ray X-248A5	$ 1,034.00
20.200.588	L-15973-4	X-248 Inspection	705.00
20.200.414	L-34411	Igniter	324.85
		MOTORS SUBTOTAL	$ 2,063.85
SUBALLOTMENTS			
Goddard Space Flight Center			$ 62,730.14
		SUBALLOTMENTS SUBTOTAL	$ 62,730.14
		PHASE I SUBTOTAL	$ 70,066.71

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE II (RAS110)(SAN MARCO A)		1964 Continued	
SUPPORT			
ADB100	L-15974	Stock Issues	$ 81.89
20.200.494	L-41255	Opaque Projector	340.96
20.200.558	NAS1-1928-6-2	Payload Separation System	1,423.00
P02583	NAS1-2455-11	Blockhouse Consoles	30,580.00
45.110.018	NAS1-3311	DOD Plant Services (DCASO)	757.60
60.400.180	NAS1-3589-12(c34)	Flyaway Disconnect	822.00
60.400.024	NAS1-3899-11	Technical Support	67,980.33
60.400.199	NAS1-4664	Systems Engineering - Scout Veh.	53,891.53
		SUPPORT SUBTOTAL	$155,877.31
VEHICLES			
60.400.135	NAS1-3589(c27)	Mod. to SM-1 Heat Shield A-15	$ 1,109.00
60.440.087	NAS1-3899-13	Fit & Eject. Test, A-15/SM-1	9,400.00
		VEHICLES SUBTOTAL	$ 10,509.00
SUBALLOTMENTS			
Western Test Range			$ 24,841.58
		SUBALLOTMENTS SUBTOTAL	$ 24,841.58
		PHASE II SUBTOTAL	$191,227.89
PHASE III (RAS110) (SAN MARCO B)			
SUPPORT			
60.400.382	L-70560	Stud Hoist Rings	$ 198.00
60.400.411	L-70900	H_2O_2 Disconnects	840.94
60.400.400	L-71670	Ballast	1,850.00
60.400.409	NAS1-3899-11-1	Tech. Support Services	3,408.17
		SUPPORT SUBTOTAL	$ 6,297.11
SUBALLOTMENTS			
Goddard Space Flight Center			$ 62,935.42
		SUBALLOTMENTS SUBTOTAL	$ 62,935.42
		PHASE III SUBTOTAL	$ 69,232.53

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE V (RAS110) SAN MARCO C)		1964 Continued	
SUPPORT			
60.400.931	NAS1-10000-J	San Marco Support	$ 7,206.00
		SUPPORT SUBTOTAL	$ 7,206.00
		FY 1964 TOTAL	$337,733.13
		FY 1965 SAN MARCO EXPENDITURES	
PHASE II (RAS110) SAN MARCO A)			
SUPPORT			
60.400.020	L-48834	Support Engineering	$ 569.48
60.400.088	L-52654	Umbilical Cables	2,400.00
60.400.226	L-59305	6 Sets Wts. for Yo Yo Despin	703.00
60.400.199	NAS1-4664	Systems Engineering Vehicles	96,108.47
		SUPPORT SUBTOTAL	$ 99,780.95
		PHASE II SUBTOTAL	$ 99,780.95
PHASE IV (RAS110) (SAN MARCO C)			
SUPPORT			
60.400.359	L-68298	Hardware	$ 207.38
60.400.379	L-69213	"O" Rings	10.90
60.400.409	NAS1-3899-11-1	Techn. Support Services	0.77
60.400.199	NAS1-4664	Systems Engineering Vehicles	400,000.00
		SUPPORT SUBTOTAL	$400,219.05
		PHASE IV SUBTOTAL	$400,219.05
		FY 1965 TOTAL	$500,000.00

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE II (SAN MARCO A)		FY 1966 EXPENDITURES	
SUPPORT			
45.110.018	NAS1-3311	DOD Plant Services (DCASO)	$ -96.00
20.200.579	NAS1-3615-2	Return LTV Crew to Dallas	20,520.00
60.400.199	NAS1-4664-5	Systems Engineering, Vehicles	50,000.00
01.030.020	NAS1-4899(12,262)	DOD Plant Services (DCASO)	4,473.55
45.110.020	NAS1-4899	DOD Plant Services (DCASO)	24.00
		SUPPORT SUBTOTAL	$ 74,921.55
		PHASE II SUBTOTAL	$ 74,921.55
PHASE IV (SAN MARCO C)			
SUPPORT			
ADB100	L-15974	Stock Issues	$ 957.91
45.110.020	NAS1-2475	DOD Plant Services (DCASO)	13.60
01.030.020	NAS1-3311(227,268)	DOD Plant Services (DCASO)	832.00
45.110.020	NAS1-3311	DOD Plant Services (DCASO)	402.40
60.400.409	NAS1-3899-11-1	Tech. Support Services	42,256.86
60.400.409	NAS1-3899-11-2	Tech. Support Services	-15,080.00
60.400.606	NAS1-4664-16(c5)	Refurb. 2 Despin P/L Sep. Sys.	2,272.17
60.400.536	NAS1-4794-7	Algol IIB Dummy Motor	500.00
60.400.531	NAS1-5880	Tech. Support Effort	144,825.00
60.400.583	NAS1-5880	Tech. Support Effort	77,575.00
60.400.775	NAS1-5880-1	Overrun	8,700.00
		SUPPORT SUBTOTAL	$ 263,254.94
		PHASE IV SUBTOTAL	$ 263,254.94
PHASE V (SAN MARCO C)			
SUPPORT			
60.400.762	NAS1-5880-2	Overrun	$ 10,903.31
60.400.931	NAS1-10000-J	San Marco Support	920.20
		SUPPORT SUBTOTAL	$ 11,823.51
		PHASE V SUBTOTAL	$ 11,823.51
		FY 1966 TOTAL	$ 350,000.00

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
PHASE IV (SAN MARCO C)		FY 1967 EXPENDITURES	
SUPPORT			
ADB100	L-15974	Stock Issues	$ 341.46
01.030.047	L-91044-14	FW-4 Motor Lift Rings	1,250.00
01.030.047	L-91044-17	FW-4 Motor Lift Rings	1,000.00
50.050.547	L-97161	Painting Shipping Containers	540.00
45.110.051	NAS1-3311(104,105)	DOD Plant Services (DCASO)	168.00
45.110.051	NAS1-3899(107)	DOD Plant Services (DCASO)	160.00
60.400.506	NAS1-4664-16	Add. Scout Vehicles	-473.00
60.400.606	NAS1-4664-16(c5)	Refurb. 2 Despin P/L Sep. Sys.	3,732.83
60.400.538	NAS1-4795-6	X-258, X-259 Dummy Motors	5,000.00
45.110.051	NAS1-5880(469,470)	DOD Plant Services (DCASO)	712.00
60.400.785	NAS1-5880-1	Overrun	17,804.00
		SUPPORT SUBTOTAL	$ 30,235.29
		PHASE IV SUBTOTAL	$ 30,235.29
PHASE V (SAN MARCO C)			
SUPPORT			
60.400.762	NAS1-5880-2	Overrun	$ 45,866.71
		SUPPORT SUBTOTAL	$ 45,866.71
		PHASE V SUBTOTAL	$ 45,866.71
SUBALLOTMENTS			
Goddard Space Flight Center			$ 23,898.00
		SUBALLOTMENTS SUBTOTAL	$ 23,898.00
		FY 1967 TOTAL	$ 100,000.00
SUPPORT			
60.400.762	NAS1-5880-2	Contract Extension	$ 55,400.98
60.400.916	NAS1-5880-5	Contract Extension	14,599.02
		SUPPORT SUBTOTAL	$ 70,000.00
		PHASE V SUBTOTAL	$ 70,000.00
		FY 1968 TOTAL	$ 70,000.00

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

FY 1964

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
TRAINING PROGRAM (PHASE I)			
Dallas			
P05373	NAS1-3311	Initial Training Program	$ 135,242.00
Wallops			
60.400.022	NAS1-3311-2	Training Program Ext.	42,430.00
60.400.365	NAS1-3311-4	Training Program Ext.	18,134.00
60.400.502	NAS1-3311-5	Training Program Ext.	3,390.00
PHASE V (SAN MARCO C)			
60.400.931	NAS1-10000-17-J	H_2O_2 Systems Rework	804.00
FY 1964 SAN MARCO TRUST FUND EXPENDITURES-LRC			$ 200,000.00

\- -

FY 1965

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
PHASE II TRAINING PROGRAM			
60.400.502	NAS1-3311-5	Final Contract Payment	$ -1,548.00
60.400.502	NAS1-3311-5	Training Program Extension	21,921.00
60.400.502	NAS1-3311-6	Training Program Refund	-15,000.00
		TRAINING PROGRAM SUBTOTAL	$ 5,373.00
PHASE IV GSE (SAN MARCO B)			
60.400.689	L-2845	Electronic Spare Parts	$ 680.00
60.400.689	L-2847	Electronic Spare Parts	50.51
60.400.689	L-7621	Collins Transmitter Spare Parts	633.70
60.400.689	L-7623	Telesco Transmitter Spare Parts	1,107.68
60.400.689	L-8566	Coaxial Cable	63.37
ADB100	L-15974	Stock Issued (Lubricating Grease)	23.99
60.400.672	L-85087-51	Generator Spare Drive-A.F.	235.00
60.400.603	L-87951	Cir. Seal Hand Valve	69.89
60.400.604	L-88261	Vinson Va. #A50063	300.02
60.400.631	L-93429	Generator Spare Parts thru WI	630.88

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
		FY 1965 Continued	
PHASE IV GSE (SAN MARCO B) Continued			
60.400.631	L-93430	Generator Spare Parts thru WI	$ 39.80
60.400.631	L-93431	Generator Spare Parts thru WI	1,003.25
60.400.631	L-93439	Generator Spare Parts thru WI	1,159.15
60.400.631	L-93440	Generator Spare Parts thru WI	2,480.00
60.400.662	L-95669	Metal Conditioner-KTP	5.88
60.400.662	L-95673	Safety Cans-McMaster	45.16
60.400.662	L-96168	Tape	112.08
60.400.662	L-96169	Paper Cups	11.30
60.400.662	L-96170	Tongue Depressors	1.65
60.400.662	L-96472	Standard Solvent & Methylene	238.43
60.400.662	L-96473	Oil	13.62
60.400.662	L-96474	Grease	20.70
60.400.662	L-96475	Oil	96.80
60.400.662	L-96479	Oil	25.00
60.400.662	L-96481	Freon	18.63
60.400.662	L-96558	Adhesive Cement	1.67
60.400.662	L-96559	Lacquer	26.40
60.400.662	L-96560	Metal Primer	17.52
60.400.662	L-96561	Sealer and Adhesive	31.99
60.400.662	L-96562	Aluminum Foil	10.20
60.400.662	L-96563	Polyethylene	18.00
60.400.662	L-96564	Steel Wire	14.55
60.400.662	L-96565	Epon Adhesive	18.90
60.400.662	L-96566	Plastic Film	300.80
60.400.662	L-96567	Paint	1.96
60.400.662	L-96568	Cartridges	34.14
60.400.662	L-96569	Paint	2.55
60.400.662	L-96570	Silicone Rubber, Adhesive, etc.	365.80
60.400.662	L-96571	Paint	17.52
60.400.662	L-96572	Tape	466.12
60.400.672	L-97702	Drive Assembly	185.47
60.400.662	L-98544	Oil	6.91
60.400.674	L-99257	Lincoln Welder	258.25
60.400.674	L-99281	Misc. - Gaskets, Seals, etc.	2,183.83
60.400.674	L-99418	Compressor Parts	2,482.61
	NAS1-5880	LTV Shipping	507.59
60.400.657	NAS1-6837	9 Drums H_2O_2	2,400.00
60.400.658	NAS1-6837	4 Drums H_2O_2	608.40
60.400.689	NAS1-7165	Electronic Spare Parts	2,870.43
60.400.689	NAS1-7167	Electronic Spare Parts	3,483.49
		PHASE IV GSE SUBTOTAL	$ 25,381.59

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
		FY 1965 Continued	
PHASE IV LAUNCHER			
60.400.300	NAS1-4899	San Marco Launcher	$ 444,000.00
60.400.351	NAS1-4899-2	Launcher Sling Set	1,263.00
		PHASE IV LAUNCHER SUBTOTAL	$ 445,263.00
PHASE IV SPARES (SAN MARCO B)			
60.400.838	L-22109	San Marco Logistics	$ 225.00
60.400.602	NAS1-4664-19(c22)	Logistics Support (MGSE)	150.00
		PHASE IV SPARES SUBTOTAL	$ 375.00
PHASE IV TRANSPORTATION (SAN MARCO B)			
60.400.800	L-16341	Shipping - D and E Sections	$ 78.59
60.400.672	C-9005749	Shipping - Drive Assembly	37.04
		PHASE IV TRANSPORTATION SUBTOTAL	$ 115.63
PHASE V (SAN MARCO C)			
60.400.935	L-35498	Spares for C/D Transmitter	$ 1,388.50
66.000.205	NAS1-5880-5	Italian Training at Wallops Island	1,508.86
60.400.920	NAS1-9203	Motor Storage Containers	1,020.28
	NAS1-10000	LTV Shipping	39.14
		PHASE V SUBTOTAL	$ 3,956.78
FY 1965 SAN MARCO TRUST FUND EXPENDITURES-LRC			$ 480,465.00
DIRECT OSS	GODDARD	Autotrack T/M Mod. Kit	$ 59,535.00
TOTAL FY 1965			$ 540,000.00

- -

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
		FY 1967	
PHASE IV SPARES (SAN MARCO B)			
60.400.791	L-14755	Spares	$ 1,809.18
60.400.602	NAS1-4664-19(c22)	Logistics Support (MGSE)	9,990.00
		SPARES SUBTOTAL	$ 11,799.18

TABLE CCXVIII Continued - SAN MARCO TRUST FUND EXPENDITURES BY FISCAL YEARS.

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
		FY 1967 Continued	
PHASE IV TRANSPORTATION (SAN MARCO B)			
60.400.800	L-16341	Shipping - D and E Sections	$ 959.84
	NAS1-5880	LTV Shipping	613.50
	NAS1-6020	LTV Shipping	659.13
		TRANSPORTATION SUBTOTAL	$ 2,232.47
PHASE V (SAN MARCO C)			
60.400.853	L-28992	Shipping Costs S-153 Pyro.	$ 10,562.42
60.400.887	NAS1-5880-5	San Marco Support, Ext. 12 Months	2,700.00
60.400.920	NAS1-9203	Motor Storage Containers	2,936.77
60.400.920	NAS1-9203-1	Motor Storage Containers	-558.00
		PHASE V SUBTOTAL	$ 15,641.19
FY 1967 SAN MARCO TRUST FUNDS EXPENDITURES-LRC			$ 29,672.84
DIRECT OSS	GODDARD	NIKE	$ 16,500.00
DIRECT OSS	WALLOPS	Electrical Spare Parts	$ 3,347.16
TOTAL FY 1967			$ 49,520.00

- -

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
		FY 1969	
STUDIES			
60.400.916	NAS1-5880-5	Italian Training at W.I.	$ 7,169.09
		STUDIES SUBTOTAL	$ 7,169.09
PHASE V (SAN MARCO C)			
60.400.948	L-9710	Shipment Dummy Motors to Rome	$ 37.00
ADB100	L-15974	Stock Issues	25.34
52.420.910	L-35267	Permatex	29.40
60.400.943	L-35707	Temperature Recorder	141.25
60.400.944	L-36147	Shock Recorder	1.75

TABLE CCXVIII Continued - SAN MARCO EXPENDITURES BY FISCAL YEAR.

FY 1969 Continued

PHASE V (SAN MARCO C) Continued

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
60.400.947	L-37563	Shipment Rocket Motors	$ 6,823.00
60.900.006	L-38622	Radar Spares	357.10
60.900.006	L-38623	Radar Spares	9.29
60.900.006	L-38624	Radar Spares	243.96
60.900.006	L-38625	Radar Spares	489.45
60.900.006	L-38626	Radar Spares	286.12
60.900.019	80330192891-901	Radar Spares	2.00
60.900.019	80330192891-902	Radar Spares	2.00
60.900.019	80330192891-903	Radar Spares	34.61
60.900.047	NAS 1-5880-6	San Marco through April 1970	13,310.00
	NAS 1-5880	Ship Dummy Motors to Rome	2,029.24
	NAS 1-5880	Shipping Sodium Flares	295.71
	NAS 1-5880	LTV Shipping	78.80
60.400.920	NAS 1-9203	Motor Storage Containers	16,643.95
		PHASE V SUBTOTAL	$ 40,938.97
		1969 SAN MARCO TRUST FUND EXPENDITURES-LRC	$ 48,009.06

- -

FY 1970

PHASE V (SAN MARCO C)

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
60.900.109	L-51971	San Marco Procurement	$ 20,157.00
60.900.124	L-52272	Shipment of Spares to S/M Range	577.41
60.900.126	L-53120	Ship Motor Vans and H_2O_2 Comp.	12,522.90
60.900.141	L-54488	Ship Motor Vans, N.Y./W.I.	2,526.48
60.900.171	L-54845	Batteries	13.44
66.000.004	L-57692	Shipment of Spares to S/M Range	6,765.24
42.500.028	L-60028	Port Handling Charges	332.00
66.000.037	L-60743	LTV Invoices, Misc. Hardware	2,524.00
66.000.044	L-62255	Shipment of S-173 Pyrotechnics	5,150.00
66.000.050	L-63081	De-emphasis Amplifiers	1,513.31
66.000.063	L-64891	Ship Air Conditioners to San Marco	489.28
66.000.072	L-65652	Transport. Chg. for Compressors	12.23
66.000.078	L-66441	Clearance Charges for Return of Vans	175.00
66.000.077	L-66446	Transportation Charges for Compressors	37.76
66.000.088	L-68800	LTV Invoice (CRA Logistics/Spares)	58,115.00

TABLE CCXVIII Continued - SAN MARCO EXPENDITURES BY FISCAL YEAR.

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
		FY 1970 Continued	
PHASE V (SAN MARCO C) Continued			
66.000.092	L-69096	Shipment of S-173 Motors (Navy Chgs.)	$ 4,449.57
66.000.146	L-74598	Nike-Apache Motor Delivery	3,520.21
66.000.231	L-83220	San Marco Shipment	192.85
66.000.110	OL-70623	"O" Rings	24.50
60.400.916	NAS1-5880-5	Italian Training at Wallops Island	18,000.00
66.000.205	NAS1-5880-5	Italian Training at Wallops Island	6,755.58
	NAS1-5880	LTV Shipping	435.05
60.400.931	NAS1-10000-17-J	Clean Room Equipment	10,083.00
60.400.931	NAS1-10000-17-J	Series A Van Rework	15,799.00
60.400.931	NAS1-10000-17-J	H_2O_2 Systems Rework	12,005.27
	NAS1-10000	LTV Shipping	49,823.92
		SAN MARCO C SUBTOTAL	$ 232,000.00
SUBALLOTMENTS			
Wallops Station (Nike/Apache Launch Support)			$ 18,000.00
		SUBALLOTMENTS SUBTOTAL	$ 18,000.00
		PHASE V SUBTOTAL	$ 250,000.00
		1970 SAN MARCO TRUST FUND EXPENDITURES-LRC	$ 250,000.00

FY 1973

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
PHASE V (SAN MARCO C RANGE SUPPORT)			
66.000.205	NAS1-5880-5	Italian Training at Wallops Island	$ 3,867.45
66.000.029	NAS1-10000-12-J	Mods. GSE S-173	78,974.00
60.400.931	NAS1-10000-17-J	H_2O_2 Systems Rework	7,027.09
66.000.205	NAS1-10000-30-J	H_2O_2 System Rework	2,448.64
66.000.205	NAS1-10000-30-J	Refurbish Series-B Vans	3,210.00
		SAN MARCO C RANGE SUPPORT SUBTOTAL	$ 95,527.18

TABLE CCXVIII Concluded - SAN MARCO TRUST FUND EXPENDITUR[illegible].

P.R. NO.	ORDER NO.	ITEM	OBLIGATED
		FY 1973 Continued	
PHASE V SAN MARCO C SPARES			
66.000.205	NAS1-10000-30-J	A/C Rework and Spares	$ 2,069.00
66.000.205	NAS1-10000-30-J	MPS-19 Radar Spares	6,007.00
		SAN MARCO C SPARES SUBTOTAL	$ 8,076.00
		PHASE V SUBTOTAL	$ 103,603.18
		PHASE VI SAN MARCO C2 PLANNED	$ 992,462.38
		FY 1973 SAN MARCO TRUST FUND EXPENDITURES-LRC	$1,258,131.56
		TOTAL SAN MARCO TRUST FUNDS	$2,266,278.46
PLANNED			$ 162,066.00

TABLE CCXIX - LANGLEY RESEARCH CENTER ALLOTMENTS FROM OSS

SAN MARCO FUNDS (894-004)

Date	Type	Amount
8-3-62	63	$1,000,000.00
10-31-62	63	1,000,000.00
12-4-63	63	-100,000.00[a]
11-12-65	63	-10,000.00
6-25-68	63	-15,239.68
4-24-70	63	-4,569.00
Subtotal FY 1963		$1,870,191.32
Suballotment-GSFC		-53,566.79
Suballotment-Wallops		-37,973.94
LRC Allotment		$1,778,650.59
7-1-63	64	$ 200,000.00
2-10-64	64	40,000.00
10-23-64	64	100,000.00
6-25-68	64	-2,266.87
Subtotal FY 1964		$ 337,733.13
Suballotment-WTR		-24,841.58
Suballotment-GSFC		-62,730.14
Suballotment-GSFC-Trans.		-62,935.42
LRC Allotment		$ 187,225.99

Date	Type	Amount
7-6-64	65	$ 50,000.00
12-15-64	65	26,000.00
3-11-65	65	424,000.00
Subtotal FY 1965		$ 500,000.00
7-29-65	66	$ 150,000.00
3-21-66	66	200,000.00
Subtotal FY 1966		$ 350,000.00
7-1-66	67	$ 100,000.00
7-29-66	67	400,000.00
12-12-66	67	-250,000.00
1-11-67	67	-150,000.00
Subtotal FY 1967		$ 100,000.00
Suballotment-GSFC		-23,898.00
LRC Allotment		$ 76,102.00
7-6-67	68	$ 25,000.00
10-24-67	68	25,000.00
12-27-67	68	20,000.00
Subtotal FY 1968		$ 70,000.00
TOTAL SAN MARCO		$3,227,924.45

---

[a] Returned.

EXHIBIT I

MEMORANDUM OF UNDERSTANDING BETWEEN THE ITALIAN SPACE COMMISSION OF THE NATIONAL COUNCIL OF RESEARCH AND THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

1. The Italian Space Commission of the National Council of Research (The Commission) and the United States National Aeronautics and Space Administration (NASA) affirm a mutual desire to conduct a series of experiments which it is hoped will culminate in the launching of a scientific satellite into an equatorial orbit. The objective is to perform measurements of atmospheric and ionospheric characteristics in a region of the earth's atmosphere not previously explored and to make the resulting scientific data freely available. This experimental program is planned to consist of three phases:

(a) First phase -- An appropriate sounding rocket will be utilized to provide a flight test of the principal elements of the scientific payload. This launching will take place from the Wallops Island Station and/or from an Italian platform of the San Marco type located near the equator.

(b) Second phase -- A prototype of the ultimate satellite payload will be placed in orbit by means of a Scout booster launched from the Wallops Island Station.

(c) Third phase -- A scientific satellite, bearing experiments as described above, will be placed in an equatorial orbit by means of a Scout booster launched from a platform of the San Marco type, located in equatorial waters.

2. The cooperating agencies shall proceed from each phase to the next upon mutual agreement that technical feasibility has been demonstrated and, in particular, that environmental requirements for the third phase of the program have been satisfied.

3. The Commission shall, in general, assume responsibility for the following:

(a) Support of Italian personnel for any training required in launching, tracking, data reduction and analysis, and other elements of the program, as mutually agreed.

(b) Design, fabrication, and testing of all payloads, including satellite engineering.

C O P Y

(c) Such studies and action as are required to assure a mutually acceptable environment for transport, handling, and launching of the Scout in the third phase of the program.

(d) The availability, equipping, maintenance, and operation of the "San Marco" towable platforms.

(e) The establishment of a suitable launch complex for the third phase of the program, including range safety provisions, as mutually agreed.

(f) Launching of the satellite in the third phase of the program.

(g) Data analysis in all phases of the program.

(h) Tracking and data acquisition facilities required in Phase III that are particular to Project San Marco and which are not available from NASA.

(i) Support, logistics, and all other costs peculiar to Project San Marco.

4. The NASA shall be responsible, in general, for the following:

(a) Provision of an appropriate sounding rocket and backup, as mutually agreed, for the first phase of the program.

(b) The provision of Scout boosters with backups for the second and third phases of the program.

(c) Such training of Italian personnel as may be feasible, and as may be accommodated without significant incremental expense.

(d) Technical consultation, as appropriate.

(e) Such additional ground testing of the payloads as may be required.

(f) The provision of data to facilitate effective design, fabrication, and testing of the payloads.

(g) Tracking and data acquisition in the first and second phases of the program as can be accomplished by existing NASA sounding rocket and unmanned satellite tracking and data acquisition facilities.

EXHIBIT I

(h) Provision of tracking and data acquisition services of the Quito, Ecuador, Minitrack Station in phase three of the program, and such additional communications support at other locations as may be feasible on a non-interference basis, subject to the concurrence, as appropriate, of any foreign governments involved. Special equipment or personnel needed in this connection will be the responsibility of The Commission.

5. No exchange of funds is contemplated between the two cooperating agencies.

6. Each agency agrees to designate a single project manager who shall be responsible for coordinating the agreed functions and responsibilities of each agency with the other. Together they will establish a joint working group with appropriate membership. Details for implementation shall be resolved on a mutual basis within this working group.

7. The scheduling of each of the three phases of the program sahll be as mutually agreed.

8. All launches which are a part of this program will be in such areas as may be agreed between the two agencies which shall consult their governments, as appropriate.

9. This Memorandum of Understanding shall be subject to the concurrence of the Italian Foreign Office and the U.S. Department of State, expressed through an exhcange of notes.

FOR THE COMMISSION:

/s/
Professor Luigi Broglio

FOR NASA:

/s/
Dr. H. L. Dryden

Geneva - May 31, 1962

C O P Y

EXHIBIT II

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
CONSIGLIO NAZIONALE DELLE RICERCHE
AND THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONCERNING THE FURNISHING OF
SATELLITE LAUNCHING AND ASSOCIATED SERVICES

In consideration of the continuing, mutually beneficial cooperative relationships between NASA and Italian agencies on peaceful space research projects, the Consiglio Nazionale delle Ricerche of Italy (CNR) and the United States National Aeronautics and Space Administration (NASA) set forth in this Memorandum of Understanding their general understandings: (1) as to the conditions under which NASA will furnish to CNR launching and associated services for spacecraft, on a reimbursable basis; and, (2) as to the responsibilities of the parties in connection with the launching. CNR and NASA intend that, at appropriate times in the future, they will enter into separate launching contracts which shall express the specific terms and conditions under which NASA will furnish launching and associated services for individual launchings requested by CNR, and which shall be in accord with the general understandings set forth in this Memorandum.

Article I

RESPONSIBILITIES

A. CNR will take the following responsibilities:

1. The design, fabrication and testing of the spacecraft and of the onboard experiments.

2. Furnishing advice to NASA of its requirements for a particular launching at as early a date as possible and in any event sufficiently in advance of the target date of the launching to accommodate financial, procurement, and operational requirements of both parties. Such advice will include details as to the spacecraft mission, payload description, orbital characteristics, launching parameters, planned launching dates and back-up launching requirements, and other information needed by NASA for planning purposes.

COPY

3. Incorporating provisions in the spacecraft design specifications and test programs to assure and demonstrate spacecraft compatibility with the launch vehicle physical constraints and in-flight environment and with tracking and data acquisition facilities.

4. Providing flight-ready spacecraft at the launching range, in accordance with the time schedule established under the launching contract.

5. Furnishing all ground-support equipment (GSE)peculiar to the mission and personnel required for its operations except for certain items of GSE which NASA may specifically agree to provide and/or operate.

B. NASA will take the following responsibilities:

1. Furnishing launch vehicle and tracking and data acquisition specifications necessary for the CNR to carry out its responsibilities under Article I, A.3. above.

2. Scheduling the launching within the general time period requested by the CNR, subject to the requirements of the United States program. If such requirements should arise, NASA will so notify the CNR as soon as possible.

3. Providing appropriate United States launch vehicles. The parties shall jointly select the vehicle to meet the mission requirements.

4. Providing necessary facilities and support, including launch crew services, for prelaunch integration of the CNR spacecraft at the launching range, and for CNR's checkout of the spacecraft.

5. Launching the spacecraft from a U.S. range.

6. Furnishing tracking and telemetry data reception from the spacecraft to ascertain achievement of orbit and vehicle performance, using existing U.S. facilities. Additional NASA tracking and data acquisition support may be arranged at CNR's request on a non-interference basis. Additional or unique equipment, ir required, will be supplied by the CNR.

7. Performing initial orbital calculations.

8. Furnishing mutually agreed technical consultation, other services, and/or GSE in support of specific or general CNR launch requirements.

Article II

IMPLEMENTATION

A. Each party will designate a Project Manager, to be responsible for coordinating the agreed functions and responsibilities of each party

with the other, pursuant to the detailed arrangements established under the launching contract. The Project Managers will be co-chairmen of a Joint Working Group, which will be the principal mechanism for assuring the execution of the project and for keeping both sides continuously informed of the project status at each stage. The CNR Project Manager will be concerned primarily with the spacecraft and the NASA Project Manager will be concerned with the vehicle, range, and ground station. Together they will be responsible for the spacecraft-vehicle, spacecraft-range and spacecraft-ground stations interfaces.

B. NASA will have operational authority over the vehicle, the launching, and associated services. The CNR will have operational authority over the spacecraft until it is mounted on the final stage motor, at which time it will become NASA's responsibility until the CNR assumes responsibility as specified in the launching contract. In accordance with normal practice, the CNR Project Manager can place a "hold" on the launching operation at any time. In carrying out their respective responsibilities, both parties will be subject to the safety and other operational regulations and procedures of the range from which the launching takes place.

C. Arrangements for the furnishing of supporting services by NASA in connection with the launching will be provided for under the launching contract. NASA may also furnish, on a reimbursable basis, minor services in support of general CNR launching requirements, at CNR's request and under arrangements to be agreed upon separately.

Article III

FINANCIAL PRINCIPLES

A. The CNR agrees in principle to be responsible for all costs incurred by it in carrying out its own responsibilities, and will reimburse NASA for costs incurred by NASA in connection with furnishing the requested launching and associated services, and any other supporting services provided at the CNR's request. The general principle under which reimbursement will be made will be that the CNR will reimburse NASA for all costs incurred by NASA in connection with and properly chargeable to the services furnished by NASA for the purposes of any scheduled CNR launching, whether or not such launching actually occurs or is successful, including an amount, to be agreed upon in advance, covering NASA's related agency-level overhead and administrative expenses. NASA may also charge an agreed rental for the use of equipment loaned to the CNR.

B. Reimbursement of NASA's costs will be made initially on the basis of an estimate to be furnished by NASA in advance, under a payment schedule to be established in the launching contract. The amount paid by the CNR on an estimated basis will be adjusted subsequently to reflect the costs actually incurred by NASA in connection with each launching. In the case of costs incurred by NASA which are not accounted for on a per launch basis, such as for launch vehicles and launch crew services,

NASA may, in determining its actual costs, allocate costs for a particular launching on a pro-rata basis.

C. The CNR will be exempted from reimbursing NASA for certain costs which might otherwise be payable under the general principle states in Paragraph A. above, such as costs incurred by NASA as a result of payment of claims of third parties for injuries, death, or damage to or loss of property, where the claims arise directly out of the launching and associated services furnished by NASA; or such as costs incurred by NASA as a result of damage to or loss of U.S. Government property under the control of NASA. This exemption from reimbursement will not apply, however, to claims of third parties, or damage to or loss of U.S. property, arising from the acts or omissions of CNR or its contractors, nor to damage to or loss of a vehicle being used in connection with or during preparation for an agreed launch, nor to damage to or the destruction of U.S. Government-owned equipment which has been made available by NASA for the use of CNR or its contractors.

Article IV

LIMITS OF NASA LIABILITY

A. Except to the extent authorized by U.S. laws pertaining to governmental liability for the negligent acts of U.S. employees, NASA will not be responsible for damage to, or the destruction of, a spacecraft or other property which has been delivered by the CNR or its contractors to NASA for the purposes of an agreed launch.

B. After final separation of a CNR spacecraft in orbit, NASA will have no responsibility in connection with its operation; the CNR will indemnify and hold the U.S. Government harmless against any liability or claim arising out of the operation of the satellite by CNR, or from its failure to operate.

Article V

DOCUMENTATION AND REPORTS

A. NASA and the CNR will exchange, through their respective Project Managers, all documents and information necessary for the successful completion of the agreed missions.

B. Immediately after each launching, the CNR will provide NASA all data from the satellite necessary for ascertaining the performance of the launch vehicle.

C. CNR shall, upon NASA's request and at NASA's expense, provide NASA with any raw data received by the CNR from the satellite and any reduced data therefrom. Any use of unpublished data by NASA shall be subject to prior permission by CNR. In any use of this data, NASA will respect the CNR's rules relating to intellectual property rights.

Article VI

REVISION

It is understood that this Memorandum of Understanding can be amended by mutual consent.

Article VII

TERMINATION

This Memorandum of Understanding shall remain in effect for seven years from the date of signature and thereafter until terminated by either agency on 180 day notice.

Article VIII

CONFIRMATION

This Memorandum of Understanding shall be subject to confirmation by the Government of Italy and the Government of the United States of America through an exchange of diplomatic notes.

(Signed)
For the Consiglio Nazionale
delle Ricerche

March 13 - 1970
Date

(Signed)
For the National Aeronautics
and Space Administration

13 March 1970
Date

COPY

ATTACHMENT TO EXHIBIT II

Rome, June 20, 1970

Excellency,

I have the honor to refer to Your Excellency's note of June 15, 1970 concerning the conditions under which launching and associated services for Italian satellites will be furnished by NASA on a reimbursable basis, the text of which in English reads as follows:

"I have the honor to refer to the Memorandum of Understanding between the National Aeronautics and Space Administration (NASA) of the United States and the Consiglio Nazionale delle Ricerche (CNR) dated March 13, 1970, concerning the conditions under which launching and associated services for Italian satellites will be furnished by NASA on a reimbursable basis.

"The Memorandum of Understanding which is set forth as an Annex to this Note, provides, inter alia, that it shall be subject to confirmation by the Government of Italy and the Government of the United States through an exchange of diplomatic notes.

"In consideration of the continuing, mutually beneficial cooperative relationships between NASA and Italian agencies on peaceful space research projects, including the arrangements under which Italy will provide launching and associated services for NASA experimental satellites at the San Marco Range, I now have the honor to inform you that the Government of the United States confirms the provisions of the Memorandum of Understanding referred to above.

His Excellency

Ambassador Graham Martin

Embassy of the United States of America
Rome

COPY

"If the Government of Italy would also confirm the provisions of the Memorandum of Understanding and this note, I have the honor to propose that my note and Your Excellency's reply to that effect shall constitute an agreement between our two governments regarding this matter which shall enter into force on the date of your reply."

I have the honor to inform you that the Government of Italy confirms the provisions of the Memorandum of Understanding and Your Excellency's note, and I therefore agree that Your Excellency's note, together with this reply, shall constitute an agreement between our two Governments regarding the matter.

Accept, Excellency, the renewed assurance of my highest consideration.

Yours,

(SIGNED)

COPY

ATTACHMENT TO EXHIBIT II

Rome, June 15, 1970

No. 278

Excellency:

I have the honor to refer to the Memorandum of Understanding between the National Aeronautics and Space Administration (NASA) of the United States and the Consiglio Nazionale delle Ricerche (CNR) dated March 13, 1970, concerning the conditions under which launching and associated services for Italian satellites will be furnished by NASA on a reimbursable basis.

The Memorandum of Understanding which is set forth as an Annex to this Note, provides, inter alia, that is shall be subject to confirmation by the Government of Italy and the Government of the United States through an exchange of diplomatic notes.

In consideration of the continuing, mutually beneficial cooperative relationships between NASA and Italian agencies on peaceful space research projects, including the arrangements under which Italy will provide launching and associated services for NASA experimental satellites at the San Marco Range, I now have the honor to inform you that the Government of the United States confirms the provisions of the Memorandum of Understanding referred to above.

If the Government of Italy would also confirm the provisions of the Memorandum of Understanding and this note, I have the honor to propose that my note and Your Excellency's reply to that effect shall constitute

His Excellency
Aldo Moro
Minister for Foreign Affairs
Rome

COPY

an agreement between our two governments regarding this matter, which shall enter into force on the date of your reply.

Accept, Excellency, the renewed assurance of my highest consideration.

(Signed) Graham Martin

Enclosure:

Memorandum of Understanding

C O P Y

ATTACHMENT TO EXHIBIT II

Republic of Italy)
Province of Rome) ss:
City of Rome)
Embassy of the United States of America)

I, Shirley E. Otis, Vice Consul of the United States of America at Rome, Italy, duly commissioned and qualified, do hereby certify that the foregoing copy of Note Verbale No. 278, dated June 15, 1970, from the Embassy of the United States of America at Rome, Italy, to His Excellency Aldo Moro, Minister for Foreign Affairs, Rome, is a true and faithful copy of the signed original, the same having been carefully examined by me and compared with the said original and found to agree therewith word for word and figure for figure.

I WITNESS WHEREOF I have hereunto set my hand and affixed the seal of the Consular Service of the United States of America at Rome, Italy, this 11th day of June, 1970.

(Signed)
Shirley E. Otis
Vice Consul of the United States of America

SEAL

COPY

EXHIBIT III

ITALY

Outer Space Cooperation: Space Science Research Program

Agreement effected by exchange of notes
Signed at Rome September 5, 1962;
Entered into force September 5, 1962.

The Vice President of the United States of America to the Italian Minister for Foreign Affairs

EMBASSY OF THE
UNITED STATES OF AMERICA
Rome, September 5, 1962

No. 236

EXCELLENCY:

I have the honor to refer to previous conversations between representatives of the United States National Aeronautics and Space Administration and the Italian Space Commission of the National Council of Research regarding cooperation in a scientific experiment which proposes the placement in orbit around the earth of an Italian satellite from an Italian launching facility by means of a rocket provided by the National Aeronautics and Space Administration. The objective of the experiment is to perform measurements of atmospheric and ionospheric characteristics of the earth's atmosphere and to make the resulting scientific data freely available to the world scientific community.

The United States Government confirms the Memorandum of Understanding signed May 31, 1962 by the United States National Aeronautics and Space Administration and the Italian Space Commission, a copy of which Memorandum is enclosed. It is understood that implementation and direction of United States participation in the proposed scientific experiment shall be the responsibility of the Italian Space Commission. The fulfillment and pace of progress of the scientific experiment shall be mutually determined by the two cooperating technical agencies and subject to the conditions which the two agencies have incorporated in the Memorandum of Understanding.

I have the honor to propose that this Note, together with Your Excellency's reply concurring therein and confirming the enclosed Memorandum of Understanding, shall constitute an Agreement between our two Governments, which shall enter into force on the date of Your Excellency's reply.

Accept, Excellency, the assurances of my highest consideration.

LYNDON B. JOHNSON
Vice-President
of the United States of America

Enclosure:

Memorandum of Understanding
May 31, 1962

His Excellency
ATTILIO PICCIONI,
Minister for Foreign Affairs,
Rome.

COPY

EXHIBIT IV - SAN MARCO USERS MANUAL

CHAPTER I

GENERAL INFORMATION

SECTION 1

INTRODUCTION

BACKGROUND

The San Marco Equatorial Mobile Range was established by the Italian Government as an independent mobile operating range to provide orbital launch capability. The present location of the range was influenced by the desire to launch scientific satellites into equatorial orbits. The decision was made to launch from mobile sea platforms in international waters to obtain the most favorable location available. A launch site was selected in Formosa Bay of the Indian Ocean about three miles off the coast of Kenya, Africa, with the range proper extending eastward from that point.

In 1962 the Italian Space Commission and the United States National Aeronautics and Space Administration signed a Memorandum of Understanding providing for a joint and cooperative project - the launching of a scientific satellite, San Marco II, into equatorial orbit utilizing a Scout vehicle. The Italian Space Commission was to provide the range equipped with a Scout launching complex, the launching crew, and the scientific satellite. The National Aeronautics and Space Administration was to provide the Scout launch vehicle, the training services for the Italian launch crew and the tracking network into which the San Marco Mobile Telemetry Station is integrated.

The San Marco Range was proposed and designed by the Centro Ricerche Aerospaziali (CRA) University of Rome. The facility construction, under the supervision of the CRA, utilized two existing off-shore platforms. A launch control center was developed on the platform, Santa Rita, obtained from the Italian National Oil Company (ENI) and a launch platform was developed on the sea-going pier, San Marco, leased from the United States Army. The CRA was also responsible for the fabrication of all the Ground Support Equipment and its integration into the complex.

Some modification and installation work on the platforms was accomplished in La Spezia, Italy, by CRA personnel during 1965. The platforms were then towed to the Port of Mombasa, Kenya, Africa, where equipment installation continued from June to November of 1966. The platforms were towed to Formosa Bay where from December 1966 to February 1967 the Range was integrated, checked out and validated.

The first satellite was successfully placed in orbit from this site on 26 April 1967, thereby establishing the San Marco Equatorial Mobile Range as an operating range.

On December 12, 1970, the Small Astronomical Satellite, SAS-A was placed in equatorial orbit from the San Marco Range by the CRA to become the first United States Satellite to be launched by another nation.

MISSION

The primary mission of the San Marco Equatorial Mobile Range is to provide the capability of placing scientific satellites into equatorial orbits by means of a Scout booster. In addition, the San Marco Range is to provide the capability of launching sounding rockets utilizing a sounding rocket omnitype launcher.

Its purpose is to provide a fully-equipped range facility for the conduct of peaceful scientific investigations of space and the upper atmosphere within the framework of international cooperation. The range is available for use by any nation or organization interested in conducting space research and exploration.

SECTION 2

RANGE CAPABILITY

GENERAL

The Range was primarily established to place satellites into equatorial orbit by means of a Scout booster. Probe and reentry tests can be launched; however, downrange instrumentation is limited and would require downrange tracking ships. The actual Range area, as defined by azimuth and elevation for a given test, is limited only by safety considerations and are discussed further in Chapter IV, Section 1. As shown in Figure 81, launch azimuth can, in general, be between 80° and 130°. Since the booster is a proven type, performance data are available which allow trajectories and impact areas to be predicted. Circular and elliptical orbit payload capabilities for due east launches from the San Marco platform using the Scout booster are shown in Figures 82 and 83 . Improvements in capability, safety and ease of operation are continually being implemented by the Centro Richerchie Aerospaziali. Figure 84 shows a Scout vehicle being launched from the San Marco platform.

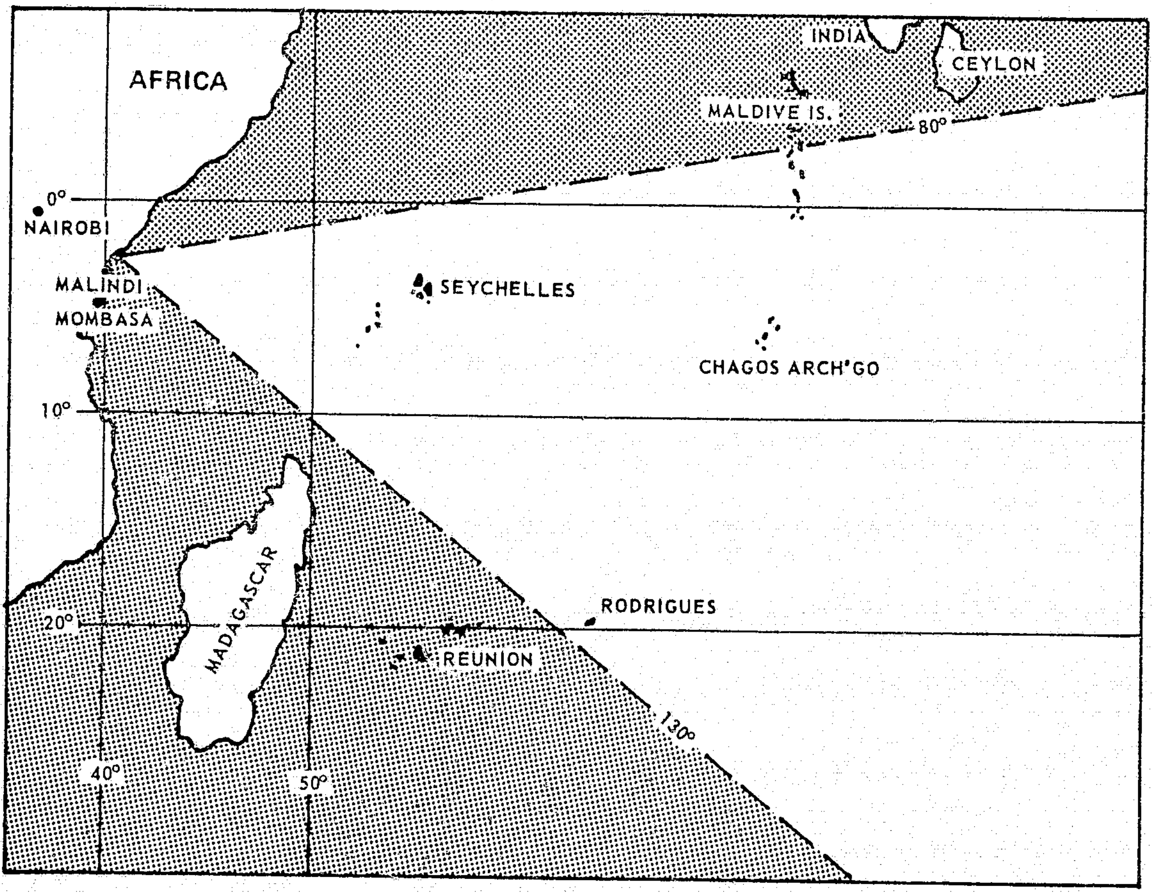


Figure 81.- San Marco equatorial mobile range outline map.

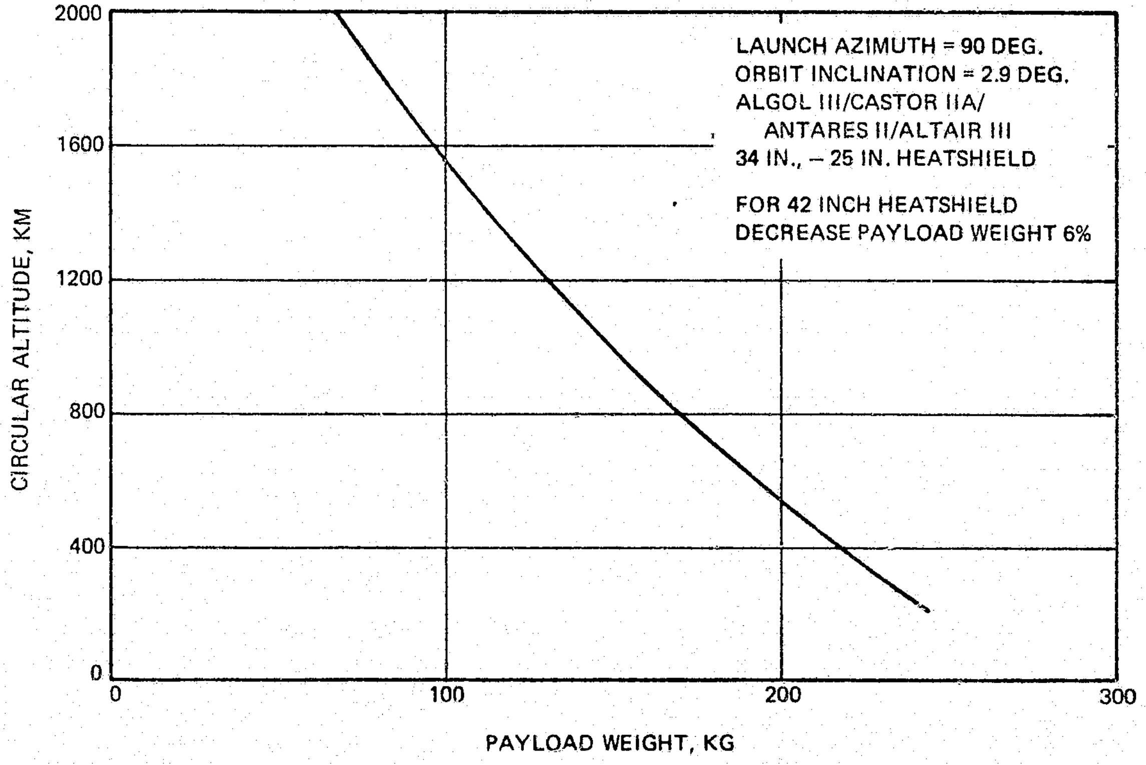


Figure 82.- Circular orbit performance San Marco launch due east.

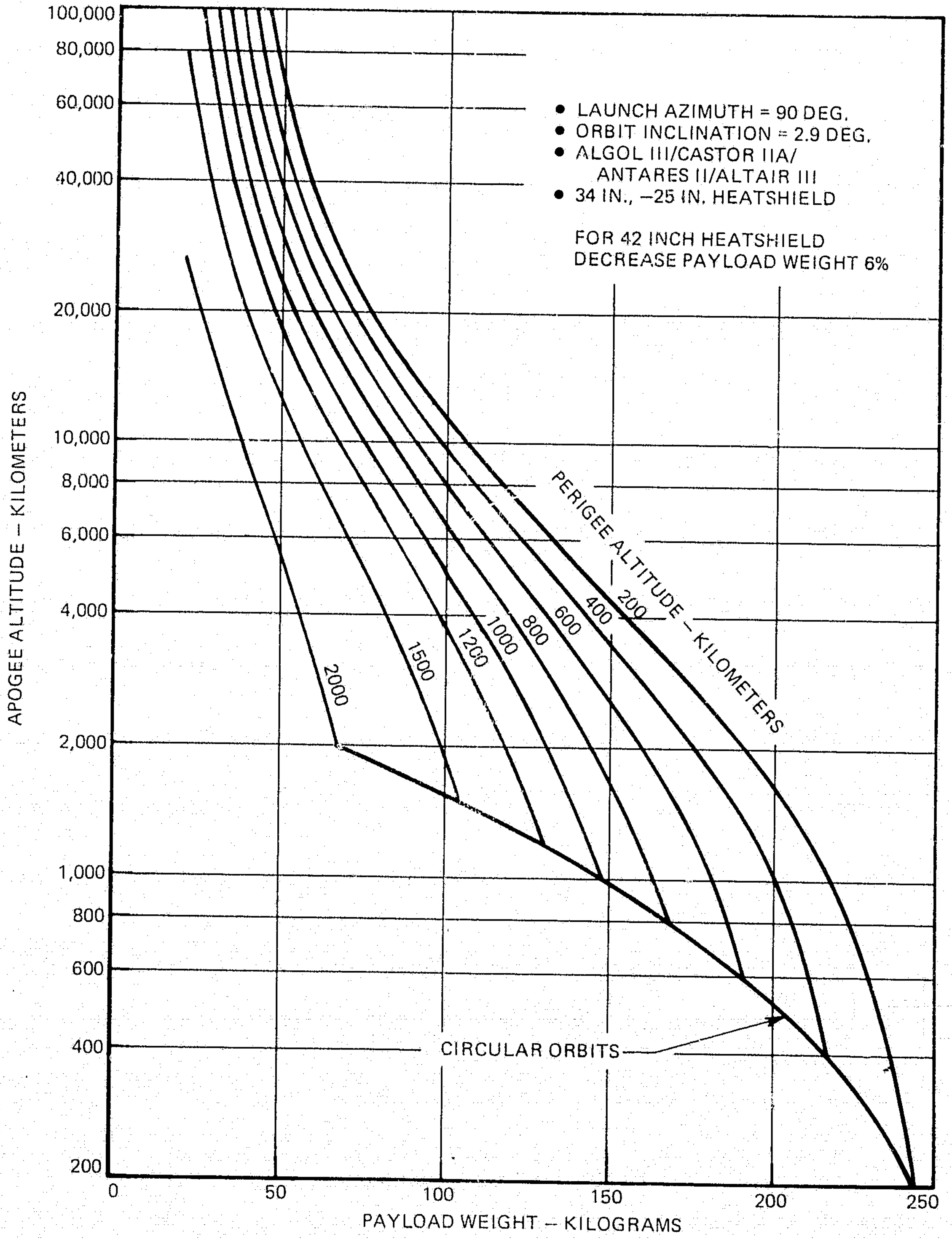


Figure 83.- Elliptical orbit performance San Marco launch due east.

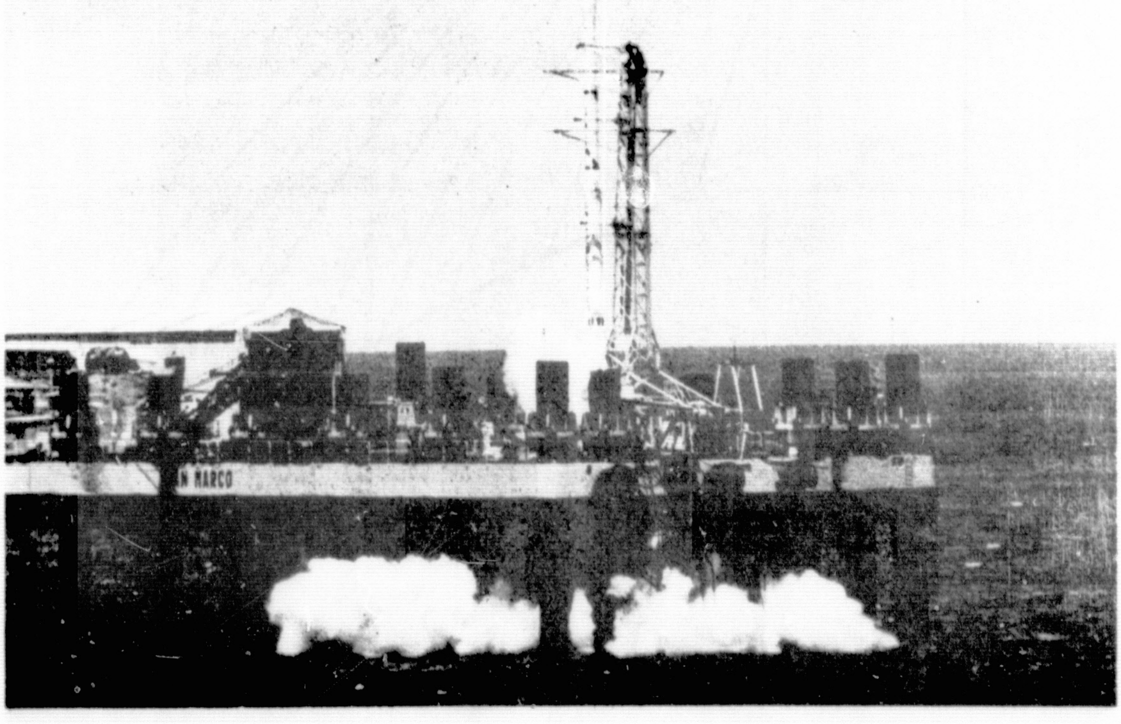


Figure 84.- Scout vehicle launch.

SECTION 3

ORGANIZATION

INTRODUCTION

The San Marco Equatorial Mobile Range is an independent range owned and operated by the Italian Government. The Centro Ricerche Aerospaziali (CRA), University of Rome is responsible f r operation and maintenance of the range. The CRA and the National Aeronautics and Space Administration (NASA) have conducted cooperative and other space projects from the San Marco Range and future projects are being planned. These projects may be either scientific in which spacecraft are jointly developed and launched or services programs wherein the CRA provides the launch services under contract for NASA scientific spacecraft. Specific responsibilities are identified by Memorandum of Understanding or other joint agreement documents established for each project.

Coordination of each project activity is conducted through a Joint Operation Working Group (JOWG) composed of appropriate representatives of the CRA, the NASA, and the Range User. The JOWG exercises overall management control of each project. Sub-working groups may be established from time to time to coordinate specific interface problems between the range, the vehicle, and the spacecraft.

SAN MARCO EQUATORIAL MOBILE RANGE

The Centro Ricerche Aerospaziali, University of Rome (CRA) is responsible for the management and direction of the San Marco Equatorial Mobile Range. The San Marco Range organization employs three major sections, each responsible for specific and clearly defined duties, and each reporting to the Range Director through the Launch Operations Division.

The Range Director is responsible for planning and executing the San Marco Range mission.

The Launch Crew is responsible for the management and direction of those engineering, technical and supporting skills necessary to plan, coordinate, direct, and perform aerospace flight test operations.

The Engineering Section is responsible for the receipt, inspection, storage, assembly, and checkout of the vehicle hardware and GSE; the readiness of the blockhouse and blockhouse systems; monitor operations relative to handling, preparation and launch; and maintenance of vehicle and GSE.

The Range Manager is responsible for organizing, planning, and coordinating the skills and services of personnel for the following functions: operate, maintain, repair and modify basic facility installations and

support equipment such as electrical power, air conditioning, automobiles, motor boats, etc.; operate supply stores; support launch activities by the construction and assembly of special pieces of equipment; operate cranes and other material handling equipment; operate machine shop.

The Range Instrumentation Section maintains and operates the range instrumentation, such as radar, telemetry, communications, photographic and optical and command destruct systems.

Supporting organizations under the direction of the Range Director include Meteorology, Safety, Health, and Administration.

DESCRIPTION OF SAN MARCO EQUATORIAL MOBILE RANGE

GEOGRAPHY

The present launch site for the San Marco Equatorial Mobile Range is located in the Indian Ocean about three miles off the coast of Kenya, Africa and about 90 miles north of the port of Mombasa. Figure 85 shows the general location of the launch site in relation to Kenya and the towns of Nairobi, Mombasa, Malindi, and the village of Ngomeni.

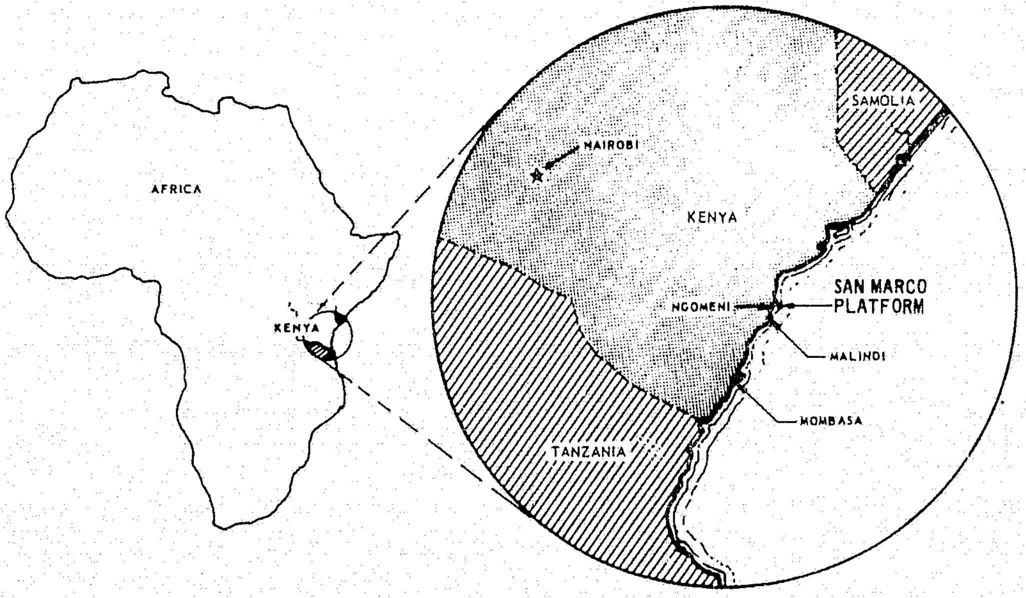


Figure 85.- San Marco range launch site map.

The complex is located near the southern end of the body of water named Formosa Bay. Base Camp is located 20 miles north of Malindi near the Ngomeni village. Figure shows the location of the main components of the complex; the San Marco Platform, the Santa Rita Platform and the Base Camp.

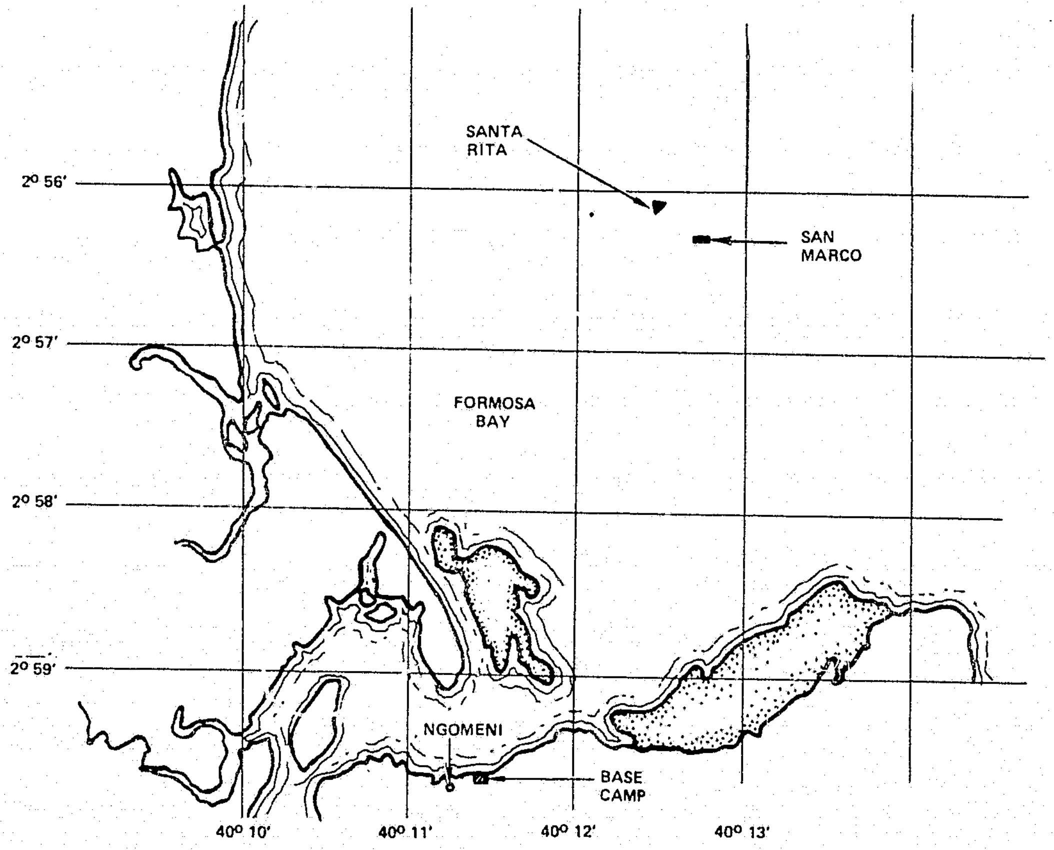


Figure 86.- Launch site layout in Formosa Bay.

The geographical location of the launcher pit on the San Marco platform is 40° 12' - 45" East longitude and 2° 56' - 18" South latitude. The Santa Rita platform is located approximately 500 meters northwest of the San Marco. Figure 87 shows the location and orientation of the two platforms. Mooring buoys are anchored at the launch site to help maintain the position of the platforms. The water depth at this location is approximately 30 feet.

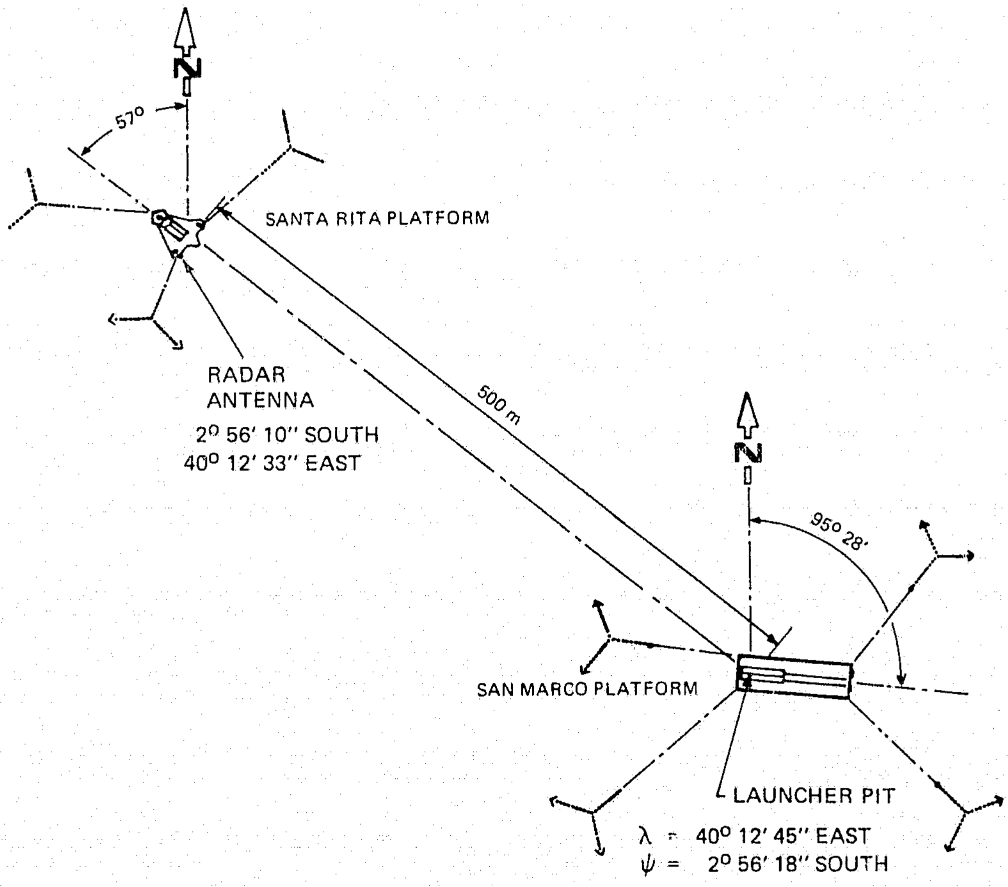


Figure 87.- Launch site geographical location.

CLIMATE

The launch complex lies approximately 200 miles south of the equator with semi-tropical temperatures averaging between 75 and 85 degrees. Tables CCXX and CCXXI are climatological statistics collected by meteorological stations at Mombasa, Kenya and Mogadiscio, Somalia. Platform readings over the past two years are congruent with these averages.

TABLE CCXX - MOMBASA CLIMATOLOGICAL STATISTICS.

PLACE – MOMBASA. LAT. 4° 3′ S, LONG. 39° 39′ E. HEIGHT ABOVE MEAN SEA LEVEL, 52 FEET

CLIMATIC TABLE COMPILED FROM 5 TO 46 YEARS' OBSERVATIONS, 1891 TO 1945

MONTH	PRESSURE AT M. S. L.	AIR TEMPERATURE MEAN OF				RELATIVE HUMIDITY		SKY NO OF DAYS (ESTIMATED)		RAIN		WIND DIRECTION 0830 PERCENTAGE OF OBSERVATIONS FROM									WIND DIRECTION 1430 PERCENTAGE OF OBSERVATIONS FROM									MEAN WIND SPEED		NO. OF DAYS WITH WIND SPEED 35 KNOTS OR MORE	NO. OF DAYS WITH FOG
	MEAN	DAILY MAX.	DAILY MIN.	HIGHEST IN EACH MONTH	LOWEST IN EACH MONTH	0830	1430	CLEAR:<2 OKTAS	CLOUDY:>6 OKTAS	AVERAGE FALL	NO. OF DAYS WITH 0.1 IN. OR MORE	N	NE	E	SE	S	SW	W	NW	CALM	N	NE	E	SE	S	SW	W	NW	CALM	0830	1430		
	mb	°F	°F	°F	°F	%	%			in																				KNOTS			
JANUARY	1010	89	75	92	73	76	66	8	6	1.1	3	25	10	2	3	2	1	10	41	6	3	37	37	12	2	3	3	3	0	3	11	0	—
FEBRUARY	1009	90	76	93	74	75	63	9	5	0.7	1	27	6	1	2	3	8	11	36	6	2	31	42	16	7	1	1	0	0	3	10	0	—
MARCH	1009	90	77	93	74	77	63	10	5	2.5	4	11	10	5	6	10	8	15	15	20	0	15	37	30	16	1	1	0	0	3	9	0	—
APRIL	1010	88	76	92	73	81	71	8	7	7.4	9	1	1	0	19	24	37	11	1	6	0	0	2	23	52	17	5	0	1	3	8	0	—
MAY	1013	84	74	85	71	85	78	3	12	12.5	14	0	0	1	4	24	50	16	1	4	0	0	0	6	51	36	7	0	0	4	7	0	—
JUNE	1015	83	73	86	70	82	72	6	9	4.7	9	0	0	0	3	31	40	17	5	4	0	0	1	3	46	37	1	2	0	5	10	0	—
JULY	1016	82	71	84	68	82	72	5	9	3.8	8	0	0	0	12	29	36	18	4	1	0	0	0	2	70	27	1	0	0	5	9	0	—
AUGUST	1016	82	71	85	68	76	72	5	9	2.4	7	0	0	0	10	35	39	13	0	3	0	0	0	5	72	18	5	0	0	4	9	0	—
SEPTEMBER	1015	83	72	86	69	81	70	7	7	2.6	7	0	0	0	10	45	38	4	1	2	0	0	0	18	63	15	3	0	1	5	8	0	—
OCTOBER	1013	85	74	87	70	79	69	9	5	3.2	5	1	0	0	20	42	22	7	1	7	0	0	1	22	54	18	3	1	1	4	8	0	—
NOVEMBER	1011	87	75	90	72	78	69	10	5	3.9	5	2	3	6	24	19	11	7	5	23	0	0	15	46	31	7	0	0	1	3	8	0	—
DECEMBER	1010	88	76	92	73	78	69	7	7	2.5	5	15	8	7	6	2	5	5	25	26	1	9	33	25	13	3	2	0	14	4	8	0	—
MEANS	1012	86	74	94*	68**	79	70	—	—	—	—	7	3	2	10	22	25	11	11	9	1	8	14	17	40	15	3	1	1	4	9	—	—
TOTALS	—	—	—			—	—	87	86	47.3	77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	—
EXTREME VALUES	—	—	—	96†	61††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NO OF YEARS' OBSERVATION	7	17-19		11-12		14		7		46	24-26	7									8									6		7	—

STANDARD OF TIME: 15° E. MERIDIAN

* MEAN OF HIGHEST EACH YEAR
** MEAN OF LOWEST EACH YEAR

† HIGHEST RECORDED TEMPERATURE
†† LOWEST RECORDED TEMPERATURE
} IN 28-29 YEARS' OBSERVATIONS

AUTHORITIES – MS DATA SUPPLIED BY B.E.A. METEOROLOGICAL SERVICE, NAIROBI.

B.E.A. METEOROLOGICAL SERVICE, COLLECTED CLIMATOLOGICAL STATISTICS
FOR EAST AFRICAN STATIONS, NAIROBI 1952

TABLE CCXXI - MOGADISCIO CLIMATOLOGICAL STATISTICS.

PLACE – MOGADISCIO. LAT. 2° 1′ N, LONG. 45° 20′ E. HEIGHT ABOVE MEAN SEA LEVEL, 39 FEET

CLIMATIC TABLE COMPILED FROM 5 TO 22 YEARS' OBSERVATIONS, 1922 TO 1950

MONTH	PRESSURE OF M. S. L.	AIR TEMPERATURE MEAN OF				RELATIVE HUMIDITY		SKY NO. OF DAYS ESTIMATED		RAIN		WIND DIRECTION																		MEAN WIND FORCE BEAUFORT SCALE		NO. OF DAYS WIND WITH FORCE 8 OR MORE	NO. OF DAYS WITH VISIBILITY LESS THAN 1/2 MILE
												PERCENTAGE OF OBSERVATIONS FROM									PERCENTAGE OF OBSERVATIONS FROM												
	MEAN	DAILY MAX.	DAILY MIN.	HIGHEST IN EACH MONTH	LOWEST IN EACH MONTH	0830	1430	CLEAR: >2 OKTAS	CLOUDY: >6 OKTAS	AVERAGE FALL	NO. OF DAYS WITH 0.06 IN. OR MORE	N	NE	E	SE	S	SW	W	NW	CALM	N	NE	E	SE	S	SW	W	NW	CALM	0830	1430		
	mb	°F	°F	°F	°F	%	%			IN.																							
JANUARY	1011	85	74	89	70	78	75	8	0.7	0	0	3	61	34	1	0	0	0	0	1	0	24	74	2	0	0	0	0	0	3	4	0	—
FEBRUARY	1011	86	74	88	70	76	72	5	0.5	0	0	0	47	52	1	0	0	0	0	0	0	12	86	2	0	0	0	0	0	3	4	0	—
MARCH	1011	88	76	90	72	76	73	2	1	0.1	0	0	25	61	14	0	0	0	0	0	0	7	77	16	0	0	0	0	0	2	3	0	—
APRIL	1011	89	78	91	73	77	74	0.3	3	2.3	3	1	3	25	33	25	9	3	1	0	0	0	26	33	32	8	1	0	0	2	2	0	—
MAY	1011	88	77	90	73	82	78	0	3	2.3	4	1	0	0	1	25	56	13	4	0	0	0	1	1	38	57	3	0	0	3	3	0	—
JUNE	1013	85	75	88	71	82	77	0.4	8	3.8	11	0	0	0	0	8	82	9	1	0	0	0	0	0	7	90	3	0	0	3	4	0	—
JULY	1013	83	73	86	70	84	79	0.1	9	2.5	9	0	0	0	0	14	81	5	0	0	0	0	0	0	9	91	0	0	0	3	4	0	—
AUGUST	1014	83	73	84	69	85	80	0.6	7	1.9	6	0	0	0	1	14	81	3	1	0	0	0	0	0	14	85	1	0	0	3	3	0	—
SEPTEMBER	1013	84	74	86	70	84	79	1	2	1.0	3	0	0	0	1	21	77	1	0	0	0	0	0	1	13	86	0	0	0	3	4	0	—
OCTOBER	1013	85	75	87	71	83	78	0.7	1	0.9	1	0	1	5	14	50	30	0	0	0	0	1	2	15	46	35	1	0	0	2	3	0	—
NOVEMBER	1012	86	75	88	71	80	78	0.6	1	1.6	3	4	26	43	17	6	2	1	0	1	0	13	50	27	8	2	0	0	0	2	3	0	—
DECEMBER	1011	87	75	89	71	79	76	2	3	0.5	0.6	7	51	40	0	0	0	1	1	0	1	30	67	1	0	0	1	0	0	3	4	0	—
MEANS	1012	86	75	92*	67**	81	77	—	—	—	—	1	18	22	7	13	35	3	1	0	0	7	32	8	14	38	1	0	0	3	3	—	—
TOTALS	—	—	—	—	—	—	—	21	39	16.9	41	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	—
EXTREME VALUE	—	—	—	94†	59††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. OF YEARS OBSERVATIONS	5-7	6-7								21-22		6-7																		6		5-6	

STANDARD OF TIME: 45° E. MERIDIAN

* MEAN OF HIGHEST EACH YEAP
** MEAN OF LOWEST YEAR YEAR

† HIGHEST RECORDED TEMPERATURE
†† LOWEST RECORDED TEMPERATURE

AUTHORITIES. MS DATA IN M. O. METEOROLOGICAL OFFICE AIR MINISTRY.

DESCRIPTION

FACILITIES

The main components of the San Marco Equatorial Mobile Range are the launching platform, the control platform and the logistic support center. The launching platform containing the launcher and ground support equipment for assembly and checkout of the vehicle and payload bears the name San Marco. The control platform containing equipment for remote control of vehicle launch, trajectory tracking and data acquisition is named Santa Rita. Two small auxiliary platforms are located adjacent to the stern of the Santa Rita. One platform supports the motor generators supplying electrical power to the Santa Rita platform; the other one supports the MPS-19 and MPS-26 Radar systems. The logistic support center is referred to as Base Camp and is located on the mainland at Ras Ngomeni.

The San Marco platform consists of a 3,000 ton DeLong type, steel barge which can be raised above the sea level by means of a lifting system consisting of twenty pneumatically operated cylindrical legs, six feet in diameter and 100 feet long. The plan size of the barge is approximately 90 feet wide by 300 feet long. Depth of the hull is 13 feet.

The general arrangement of the San Marco platform is shown in Figures 88 through 91. The major items are described as follows:

(1) LAUNCHER - This is a standard Scout vehicle launcher.

(2) VEHICLE TRANSPORTER - This is a standard Scout vehicle transporter.

(3) SHELTER "S1" - This shelter houses the launcher and the vehicle assembly and checkout area. It is moved to the bow section of the platform prior to launcher erection.

(4) PYROTECHNIC STORAGE ROOM - This room is used to store pyrotechnic devices prior to installation in vehicle.

(5) CRANE, MOBILE - This is a 35 ton mobile crane used to handle equipment and materials on deck.

(6) SHELTER "S2" - This shelter is for rocket motor storage.

(7) WATER RESERVOIR - This reservoir is a part of one of the legs and provides head pressure to fire fighting water system.

(8) LIFE BOAT - This is a standard life boat with a capacity for 50 personnel.

(9) TEST ROCKET LAUNCHER - This is a multipurpose rocket launcher.

(10) PLATFORM ACCESS LADDERS - These ladders provide access to the platform from small boats.

(11) BATTERY PREPARATION AND PYROTECHNIC CHECKOUT TRAILER VAN - This van houses the equipment to service and checkout batteries and to checkout small pyrotechnic devices.

INDEX NO.	NUMERICAL LEGEND
1	LAUNCHER
2	VEHICLE TRANSPORTER
3	SHELTER "S1"
4	PYROTECHNIC STORAGE ROOM
5	CRANE, MOBILE
6	SHELTER "S2"
7	WATER RESERVOIR
8	LIFE BOAT
9	TEST ROCKET LAUNCHER
10	PLATFORM ACCESS LADDERS
11	BATTERY PREP & PYRO CHECKOUT
12	CAPSTAN HUT
13	POWER PLANT
14	WORK SHOP TRAILER VAN
15	SHELTER "S3"
16	CRANE, 500 KG
17	VEHICLE TEST SET TRAILER VANS
18	SUBMARINE CABLE RAMP
19	ELECTRICAL TERMINAL ROOM
20	SALT WATER TANK
21	FRESH WATER TANK
22	ELECTRICAL POWER ROOM AND DE-SALTING UNIT
23	MATERIAL SERVICE OFFICE
24	REST ROOM
25	STORAGE ROOM
26	AIR CONDITIONED STORE ROOM
27	STORE ROOM
28	STORE ROOM
29	DIESEL OIL TANK
30	COMPRESSED AIR PLANT
31	ENGINEERING OFFICE
32	H_2O_2 SERVICING UNIT
33	EXHAUST OPENING
34	LAUNCHER PIT
35	KITCHEN AND DINING AREA

ALPHABETICAL LEGEND	SHEET NO.	INDEX NO.
BATTERY PREP & PYRO CHECKOUT	2	11
CAPSTAN HUT	2-3	12
COMPRESSED AIR PLANT	4	30
CRANE, MOBILE	2-3	5
CRANE, 500 KG	2-3	16
DIESEL OIL TANK	4	29
ELECTRICAL POWER ROOM AND DE-SALTING UNIT	4	22
ELECTRICAL TERMINAL ROOM	4	19
ENGINEERING OFFICE	4	31
EXHAUST OPENING	4	33
FRESH WATER TANK	4	21
H_2O_2 SERVICING UNIT	4	32
KITCHEN AND DINING AREA	4	35
LAUNCH	2-3	1
LAUNCHER PIT	4	34
LIFE BOAT	2	8
MATERIAL SERVICE OFFICE	4	23
PLATFORM ACCESS LADDERS	2-3	10
POWER PLANT	2-3	13
PYROTECHNIC STORAGE ROOM	2	4
REST ROOM	4	24
SALT WATER TANK	4	20
SHELTER "S1"	2	3
SHELTER "S2"	2-3	6
SHELTER "S3"	2-3	15
STORE ROOM	4	25
STORE ROOM, AIR CONDITIONED	4	26
STORE ROOM	4	27
STORE ROOM	4	28
SUBMARINE CABLE RAMP	2-3	18
TEST ROCKET LAUNCHER	2	9
VEHICLE TEST SET TRAILER VANS	2-3	17
VEHICLE TRANSPORTER	2-3	2
WATER RESERVOIR	2-3	7
WORK SHOP TRAILER VAN	2-3	14

Figure 88.- Legend, San Marco Platform.

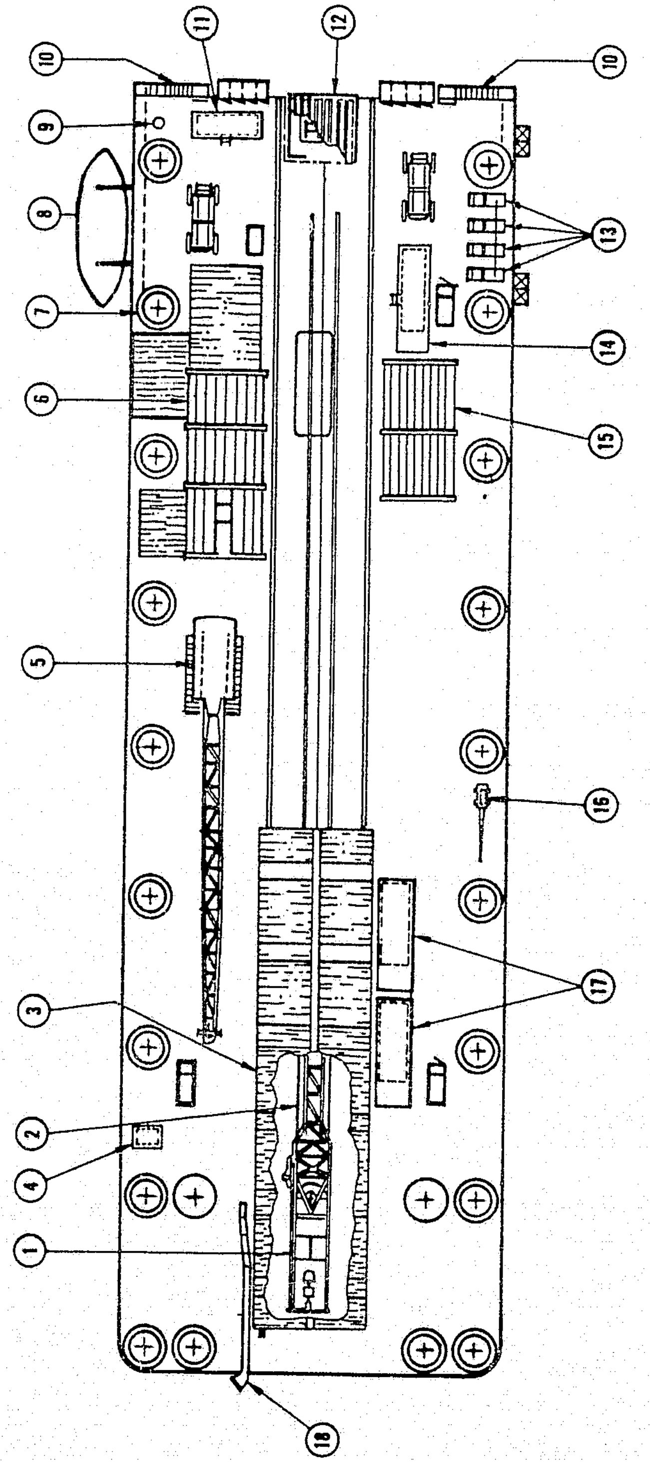


Figure 89.- San Marco Platform Deck.

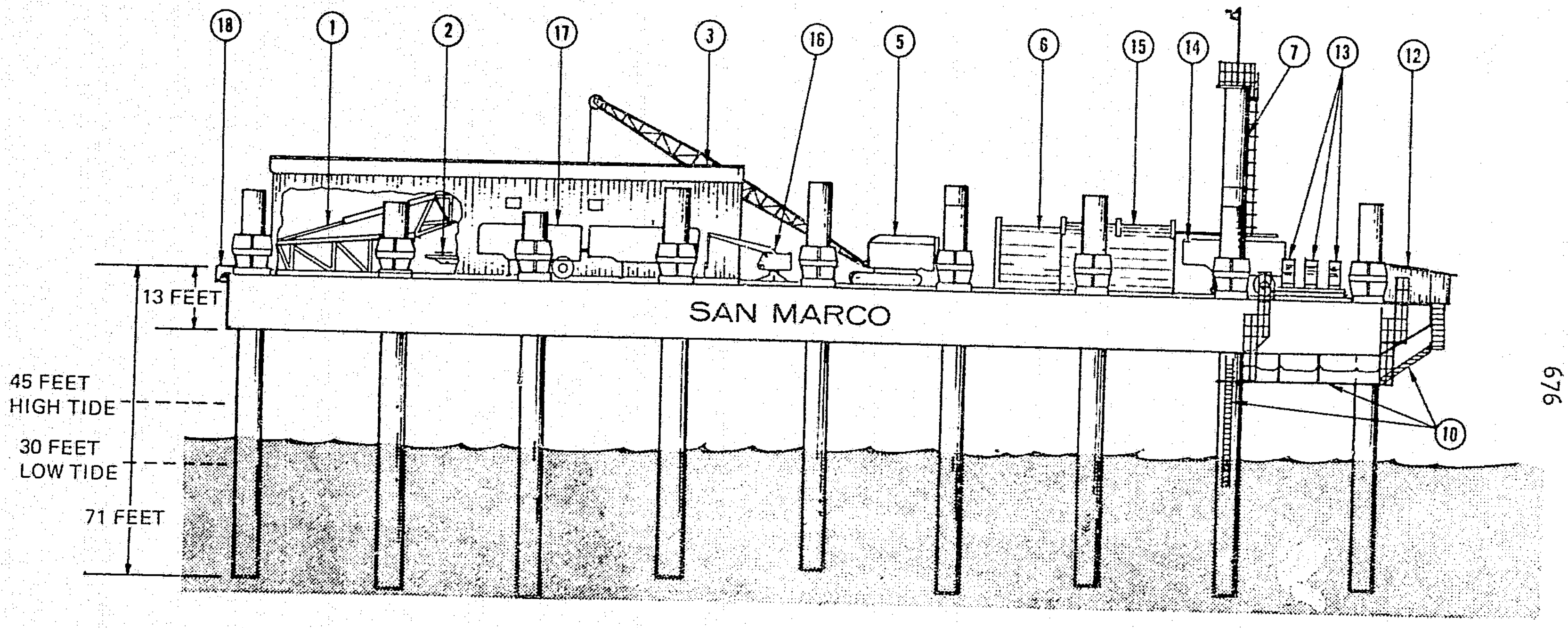


Figure 90.- San Marco Platform Starboard Profile.

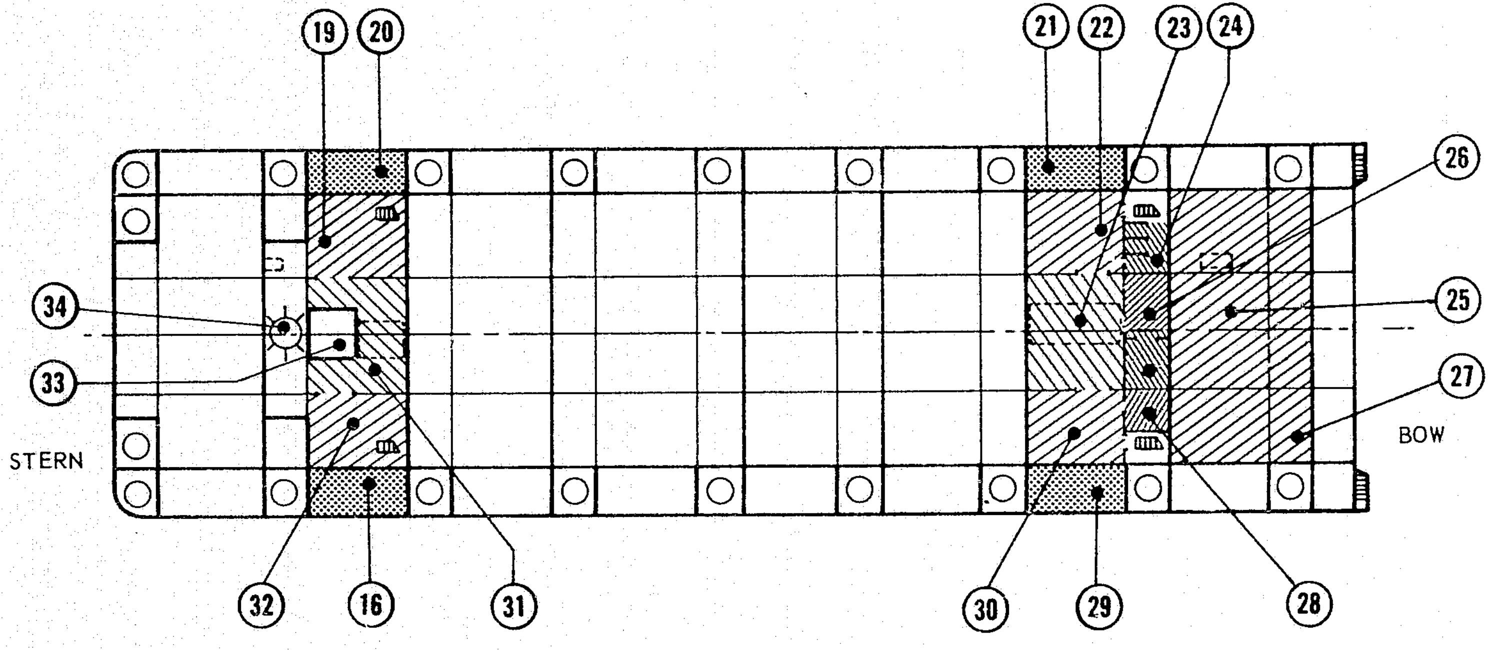


Figure 91.- San Marco Platform Layout (below deck).

(12) CAPSTAN HUT - This hut houses the capstan winch used to move S1 shelter.

(13) POWER PLANT - The power plant consists of 100 KW diesel motor generators supplying electrical power for the platform.

(14) WORK SHOP TRAILER VAN - This van houses the machine tool equipment used for maintenace and repair operations.

(15) SHELTER "S3" - This shelter is an environmental controlled clean room primarily used for spacecraft assembly and checkout.

(16) CRANE, 500 Kg - This is a fixed crane used to handle cargo off and on the platform.

(17) VEHICLE TEST SET TRAILER VANS - These vans house the electroic test equipment for assembled vehicle checkout. The trailers are disconnected and moved to the bow section of platform prior to countdown.

(18) SUBMARINE CABLE RAMP - Cabling from the Santa Rita platform is routed onto this platform through this cable ramp.

(19) ELECTRICAL TERMINAL ROOM - This room contains the terminals for the submarine cables connecting the platforms.

(20) SALT WATER TANK - Salt water reservoir for platform use.

(21) FRESH WATER TANK - Fresh water reservoir for platform use.

(22) ELECTRICAL POWER ROOM AND DE-SALTING UNIT - This unit converts salt water to fresh water for platform use.

(23) MATERIAL SERVICE OFFICE - This office is the logistics headquarters for the platforms.

(24) REST ROOM - The rest room has modern plumbing, flush toilets and wash basins.

(25) STORAGE ROOM - This room is for general storage of material.

(26) AIR CONDITIONED STORAGE ROOM - This storage room is air conditioned and is used for vehicle component storage.

(27) STORE ROOM - This is a general purpose store room.

(28) STORE ROOM - This is a general purpose store room

(29) DIESEL OIL TANK - Storage tank for diesel motor generator fuel.

(30) COMPRESSED AIR PLANT - Provides dehumidified air for the vehicle ground support equipment.

(31) ENGINEERING OFFICE - This compartment provides office space for Engineering personnel.

(32) H_2O_2 SERVICING UNIT - The Scout vehicle H_2O_2 servicing unit is located in this compartment.

(33) EXHAUST OPENING - This opening is cut through the platform to provide a passage for vehicle gasses to exhaust during liftoff.

(34) LAUNCHER PIT - This is an opening in the platform deck below the launcher base to provide a throughway for cabling and plumbing coming into launcher.

(35) KITCHEN AND DINING AREA - This is a fully equipped kitchen for preparing meals for the platform crew and an adjacent dining area.

The Santa Rita platform is a LeTourneau drilling type three leg sea platform. It is roughly the shape of an isoceles triangle having a base of 115 feet and 120 feet in height. The legs are electrically operated. Seven portable trailer vans located on the main deck house the launch support or blockhouse equipment plus telemetry and communication equipment. Built onto the main deck and rising above these vans is the first deck, comprising administrative compartments and crew quarters. The dining area comprises the second deck located directly above the first deck. Two major compartments below the main deck contain the Range Control Center and a Communication Center. This Communication Center can be differentiated from that in the trailer van on the main deck in that the trailer housed system is for on-board inter-platform communications whereas this system is for platform to shore communications. Other below deck compartments include the calibration lab, a conference room, and store rooms.

Two auxiliary platforms are located close off the stern of the Santa Rita. These four-legged platforms are not floatable, their legs having been driven into the ocean floor by pile driver. The larger of the two platforms (15 x 15 meters) supports the MPS 19 and MPS 26 Radar Systems and two optical trackers. The smaller platform (8 x 8 meters) supports the six 100 KW diesel driven motor generators. This power plant serves the Santa Rita platform equipment and the launch equipment on the San Marco platform during launching operations. The general arrangement of Santa Rita platform is shown in Figures 92 through 95.

The major items are briefly described as follows:

(1) CRANE - This is a stationary crane and is used to transfer cargo arriving by ship and to handle equipment and material on deck (300 ft. ton capacity).

INDEX NO.	NUMERICAL LEGEND
1	CRANE, 18 TON
2	TELEMETRY ANTENNA
3	SUBMARINE CABLE RAMP
4	MICOPERI PLATFORM
5	POWER PLANT
6	CRANE, 20 TON JIB
7	OPTICAL TRACKERS
8	AUXILIARY PLATFORM
9	"S" BAND RADAR TRAILER VAN
10	"C" BAND RADAR TRAILER VAN
11	"S" BAND RADAR COMPUTER TRAILER VAN
12	LIFE RAFT
13	ANEMOMETER TOWER
14	METEOROLOGY CENTER
15	RADIO ROOM
16	CRANE, 500 KG
17	LIFE BOAT
18	TROPOSCATTER ANTENNA
19	HELICOPTER PLATFORM
20	SKYSCREENS
21	SALT WATER RESERVOIR
22	VHF ANTENNA
23	COMMAND DESTRUCT TRAILER VAN
24	TELEMETRY SYSTEM TRAILER VAN
25	VEHICLE CONTROL CENTER NUMBER 4
26	VEHICLE CONTROL CENTER NUMBER 3
27	VEHICLE CONTROL CENTER NUMBER 1 AND 2
28	COMMUNICATION CENTER TRAILER VAN
29	DE-SALTING UNIT
30	PLATFORM CONTROL PANEL
31	HATCH
32	ENGINE ROOM
33	LAVATORY
34	RANGE CONTROL CENTER
35	COMMUNICATION CENTER
36	STORE ROOMS
37	FRESH WATER TANK
38	DIESEL OIL TANK
39	STORE ROOM
40	POWER DISTRIBUTION
41	CALIBRATION LABORATORY
42	STORE ROOM
43	CONFERENCE ROOM
44	DINING AREA
45	KITCHEN
46	CAMERA MOUNT
47	REST ROOM
48	STORE ROOM
49	QUARTERS
50	CONFERENCE ROOM
51	OFFICE
52	QUARTERS
53	DISPENSARY
54	DIRECTORS QUARTERS
55	FOOD STORAGE

ALPHABETICAL LEGEND	SHEET NO.	INDEX NO.
ANEMOMETER TOWER	2-3	13
AUXILIARY PLATFORM	2-3	8
"C" BAND RADAR TRAILER VAN	2-3	10
CALIBRATION LABORATORY	4	41
CAMERA MOUNT	4	46
COMMAND DESTRUCT TRAILER VAN	3-4	23
COMMUNICATION CENTER TRAILER VAN	4	28
COMMUNICATION CONTROL CENTER	4	35
CONFERENCE ROOM	4	43
CONFERENCE ROOM	4	50
CRANE, 18 TON	2-3	1
CRANE, 20 TON JIB	2-3	6
CRANE, 500 KG	2-3	16
DE-SALTING UNIT	4	29
DIESEL OIL TANK	4	38
DINING AREA	4	44
DIRECTORS QUARTERS	4	54
DISPENSARY	4	53
ENGINE ROOM	4	32
FOOD STORAGE	4	55
FRESH WATER TANK	4	37
HATCH	4	31
HELIPORT	2-3	19
KITCHEN	4	45
LAVATORY	4	33
LIFE BOAT	1	17
LIFE RAFT	1	12
METEOROLOGY CENTER	2-3-4	14
MICOPERI PLATFORM	2-3	4
OFFICE	4	51
OPTICAL TRACKERS	2-3	7
PLATFORM CONTROL PANEL	4	30
POWER DISTRIBUTION	4	40
POWER PLANT	2-3	5
QUARTERS	4	49
QUARTERS	4	52
RADIO ROOM	2-4	15
RANGE CONTROL CENTER	4	34
REST ROOM	4	47
SALT WATER RESERVOIR	3	21
"S" BAND RADAR COMPUTER TRAILER VAN	2	11
'S" BAND RADAR TRAILER VAN	2-3	9
SKYSCREENS	2-3	20
STORE ROOM	4	36
STORE ROOM	4	39
STORE ROOM	4	42
STORE ROOM	4	48
SUBMARINE CABLE RAMP	2-3	3
TELEMETRY ANTENNA	2-3	2
TELEMETRY SYSTEM TRAILER VAN	4	24
TROPOSCATTER ANTENNA	2-3	18
VEHICLE CONTROL CENTER NUMBER 4	4	25
VEHICLE CONTROL CENTER NUMBER 3	4	26
VEHICLE CONTROL CENTER NUMBER 1 AND 2	4	27
VHF ANTENNA	3	22

Figure 92.- Legend, Santa Rita Platform.

18 tons @ 3.6 meters
5 @ 12.0
2.1 @ 22.8

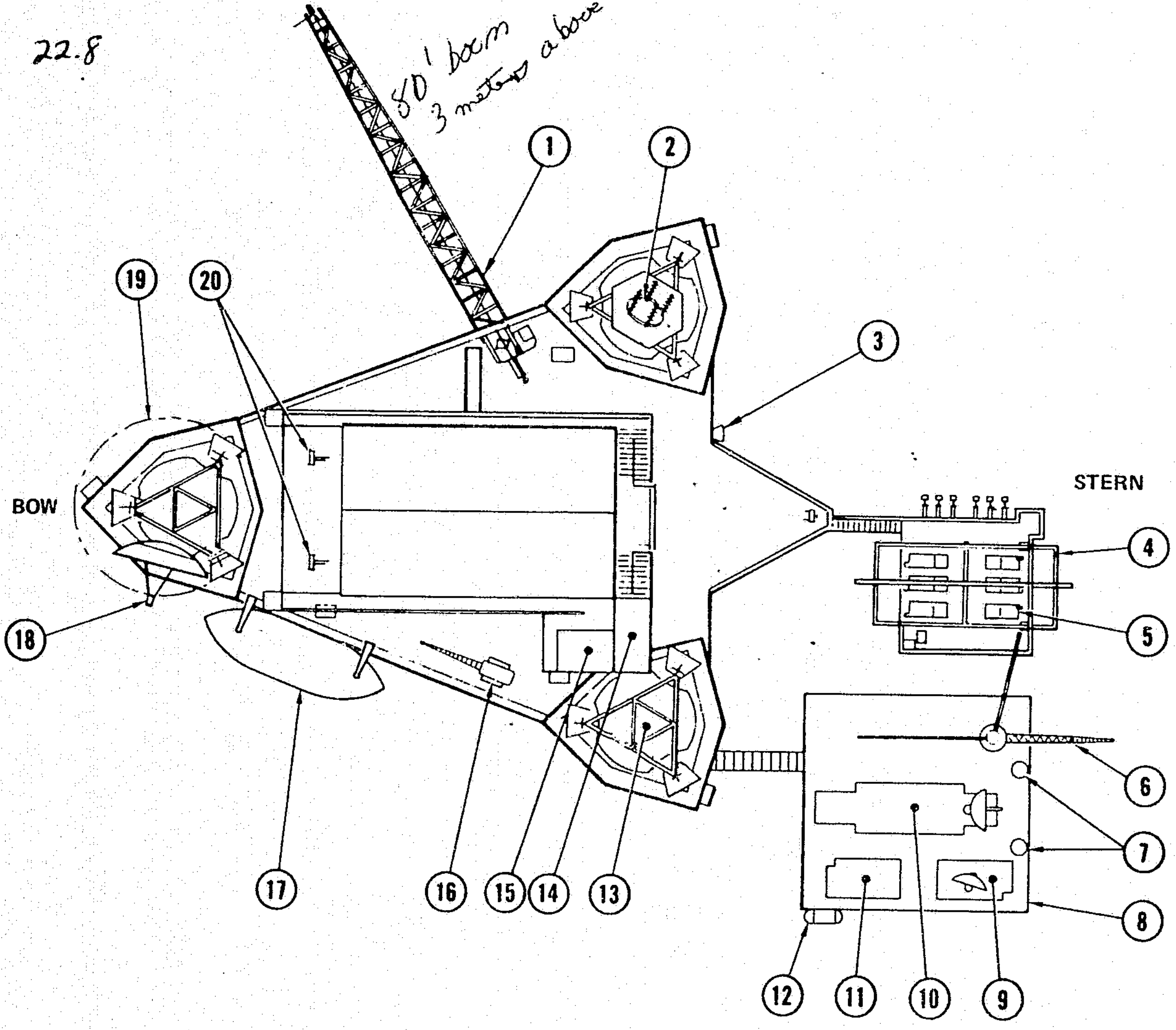


Figure 93.- Santa Rita Platform Deck.

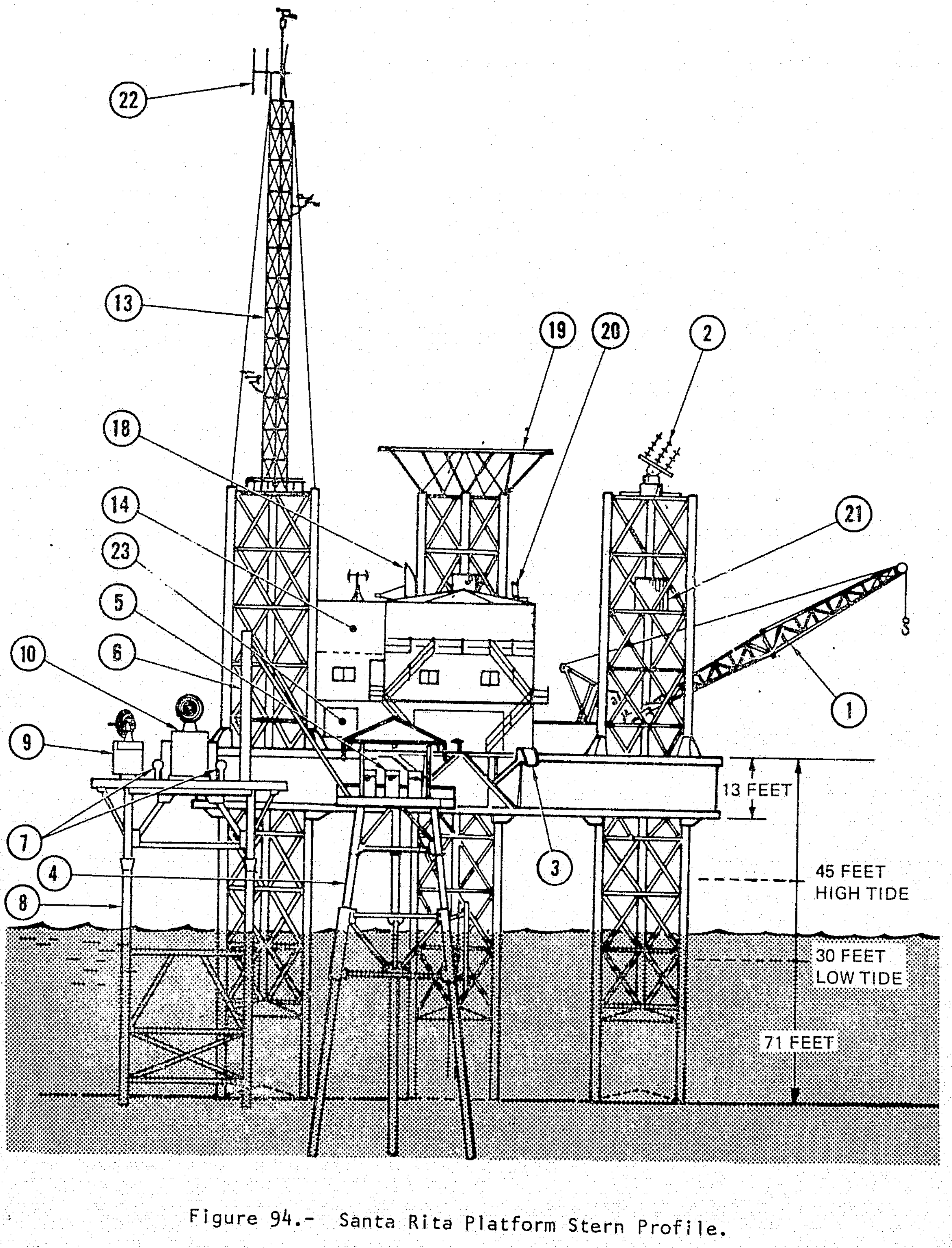
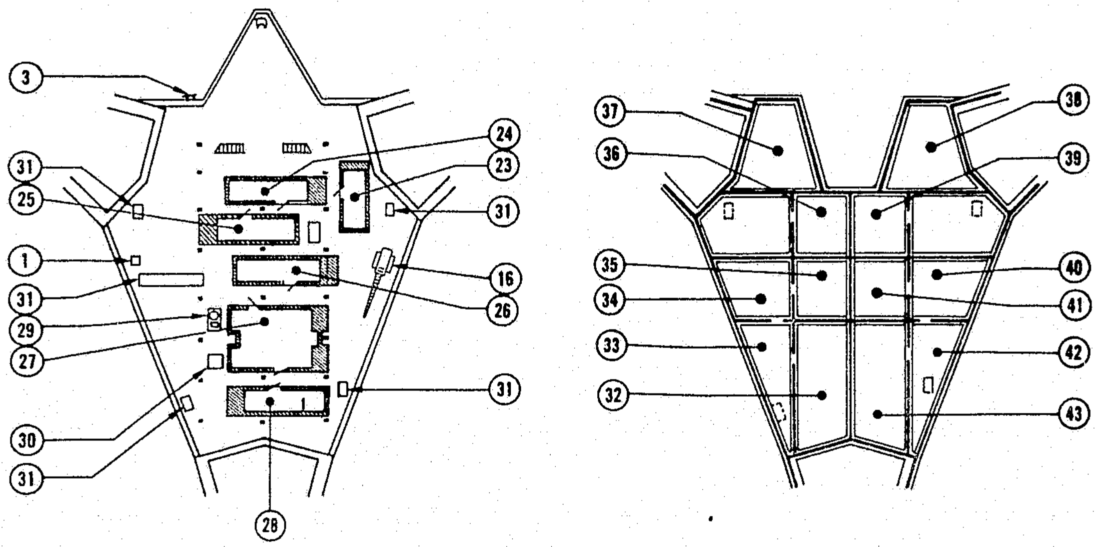
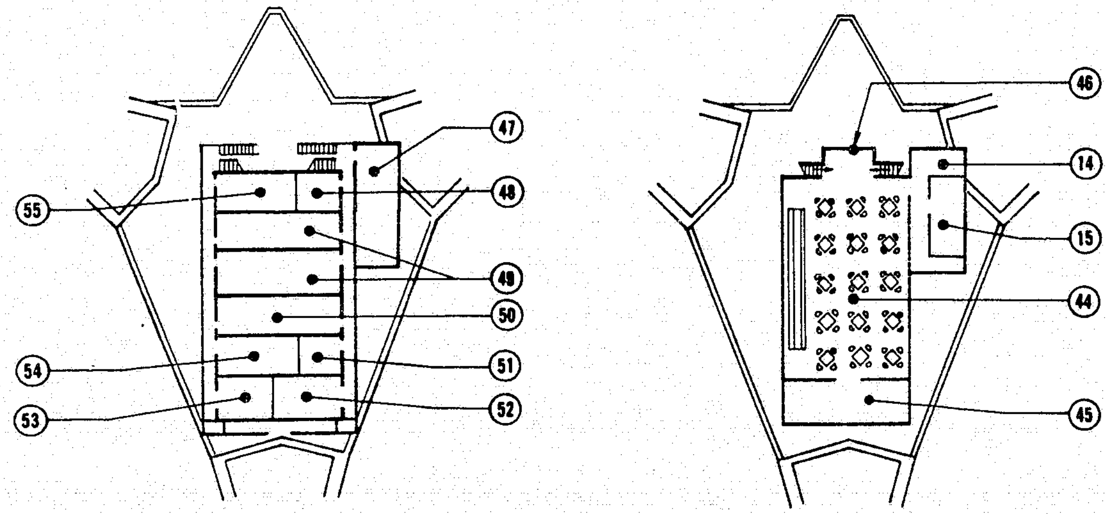


Figure 94.- Santa Rita Platform Stern Profile.



MAIN DECK

BELOW DECK



FIRST DECK

SECOND DECK

Figure 95.- Santa Rita Platform.

(2) TELEMETRY AUTO TRACKING ANTENNA - This is a medium gain monopulse auto tracking antenna.

(3) SUBMARINE CABLE RAMP - Cabling from the San Marco platform is routed into this platform through this ramp.

(4) MICOPERI PLATFORM - This platform supports the Santa Rita platform power plant.

(5) POWER PLANT - The power plant consists of six 100 KW diesel motor generators supplying electrical power to the Santa Rita platform.

(6) CRANE - This is a jib type crane with a capacity of used to transfer equipment to and from the auxiliary platform.

(7) OPTICAL TRACKERS - These are manually operated optical sights used to track the vehicle trajectory.

(8) AUXILIARY PLATFORM - The platform, approximately 15 meters square, supports the Radar Systems trailer vans.

(9) "S" BAND RADAR TRAILER VAN - This van houses the MPS-19 radar system. The antenna is mounted on top of the van.

(10) "C" BAND RADAR TRAILER VAN - This van houses the MPS-26 radar system. The antenna is mounted on top of the van.

(11) "S" BAND RADAR COMPUTER TRAILER VAN - This van houses the computer equipment for the MPS-19 radar.

(12) LIFE RAFT - This container is one of several located on the platforms that holds life rafts for emergency evacuation.

(13) ANEMOMETER TOWER - This tower supports the anemometers for meteoroligical data gathering.

(14) METEOROLOGY CENTER - This office houses meteorological equipment and personnel and serves as the weather station for the range.

(15) RADIO ROOM - This room houses the range radio equipment.

(16) CRANE, 500 Kg - This is a fixed crane used to transfer material to and from the platform.

(17) LIFE BOAT - This is a standard life boat with a capacity for 50 personnel,

(18) TROPOSCATTER ANTENNA - This antenna is a part of the basic external communication network.

(19) HELIPORT - A helicopter landing platform is located atop the bow leg of the platform.

(20) SKY SCREEN - These are vertical wire type used to monitor vehicle trajectory.

(21) SALT WATER RESERVOIR - This reservoir contains salt water for conversion to fresh water and for other platform uses.

(22) VHF ANTENNA - This antenna is a part of the basic external communication network.

(23) COMMAND DESTRUCT TRAILER VAN - This van houses the command-destruct equipment.

(24) TELEMETRY STATION TRAILER VAN - This van houses the telemetry system equipment.

(25) VEHICLE CONTROL CENTER NO. 4 - This van houses terminal racks and "J" boxes for the vehicle control equipment.

(26) VEHICLE CONTROL CENTER NO. 3 - This van houses the relay racks and power supplies for the vehicle control equipment.

(27) VEHICLE CONTROL CENTER - This is two vans, vehicle control center No. 1 and vehicle control center No. 2, placed side by side with adjacent walls removed to form one large room housing the equipment for remote vehicle checkout and launch (blockhouse).

(28) COMMUNICATION CENTER TRAILER VAN - This van houses the intercommunications systems.

(29) DE-SALTING UNIT - This unit converts salt water into fresh water.

(30) PLATFORM CONTROL PANEL - The platform elevating mechanism is controlled from the panel.

(31) HATCH - Provides access to below deck compartments.

(32) ENGINE ROOM - This room houses diesel units which supply power for the mechanism which raises and lowers the platform.

(33) LAVATORY - This compartment contains modern toilet facilities,

(34) RANGE CONTROL CENTER - This compartment houses the Radar and T/M plot boards and TV monitors.

(35) COMMUNICATIONS CENTER - This compartment houses radio and teletype equipment used primarily for platform to shore communications.

(36) STORE ROOMS - This is a general purpose store room.

(37) FRESH WATER TANK - This is a fresh water reservoir for platform use.

(38) DIESEL OIL - Storage tank for diesel motor generator fuel.

(39) STORE ROOMS - This is a general purpose store room.

(40) POWER DISTRIBUTION - Electrical power from the power plant is distributed to the Santa Rita platform in this compartment.

(41) CALIBRATION LABORATORY - This laboratory has primary and secondary standards used to calibrate electronic equipment.

(42) STORE ROOM - This is a general purpose store room.

(43) CONFERENCE ROOM - This conference room has a capacity for 30 personnel.

(44) DINING AREA - This is the dining area for the crew.

(45) KITCHEN - This is a fully equipped kitchen for preparing meals for the crew.

(46) CAMERA MOUNT - This is a TV camera mount to provide surveillance of the San Marco platform.

(47) REST ROOM - This rest room contains modern toilet facilities.

(48) STORE ROOM - This is a general purpose store room..

(49) QUARTERS - These rooms provide living quarters for the crew.

(50) CONFERENCE ROOM - This conference room has a capacity for 20 personnel.

(51) OFFICE - This is the office of platform administration personnel.

(52) QUARTERS - These rooms provide living quarters for the crew.

(53) DISPENSARY - This room houses first aid equipment and supplies.

(54) DIRECTOR'S QUARTERS - This space provides living quarters for the Range Director.

(55) FOOD STORAGE - This store room is for food storage.

The Base Camp is located on the coast about 20 miles north of Malindi. The camp is a fenced area about 150 feet x 400 feet. The general arrangement of the Base Camp is shown in Figure 96 and table CCXXII. The major items are briefly described as follows:

(1) DOCK - This dock is used for loading and unloading personnel and material between base camp and the platforms. A 10 ton capacity chain fall is mounted on the dock.

(2) STAND - This observation stand provides a place for spectators to view experiments launched from the San Marco platform.

(3) SKY SCREEN - This is a vertical wire type sky screen used to obtain vehicle trajectory information.

(4) MESS HALL - This building houses the kitchen and food serving facilities as well as a radio communication center.

(5) INTERFEROMETER FACILITY - This is a range instrumentation facility that is capable of determining a vehicle's position and velocity in space.

(6) CONCRETE SLAB - This slab is the parking area for the MITS antenna truck.

(7) CONCRETE SLAB - Spacecraft trailer vans and the MITS trailer vans are parked on this slab.

(8) VOLLEY BALL COURT - This is a regulation volley ball court.

(9) WELL - Water supply for Base Camp.

(10) POWER PLANT - The electrical power plant consists of two 30 KW diesel motor generators.

(11) SHOP - This shop houses equipment and space to accomplish general maintenance and repair.

(12) SHED - This is a shelter for trucks and other automotive equipment.

(13) AUTOMOTIVE MAINTENANCE PIT - This is two elevated platforms with ramps onto which automotive equipment can be driven to accomplish maintenance and repair.

(14) SHOP - This shop houses equipment and space to accomplish automotive maintenance and repair.

TABLE CCXXII - BASE CAMP LAYOUT INDEX.

INDEX NO.	NUMERICAL LEGEND	ALPHABETICAL LEGEND	INDEX NO.
1	DOCK	ANTENNA TOWER	15
2	STAND	AUTOMOTIVE MAINTENANCE PIT	13
3	SKY SCREEN	BARRACKS	20-21-28
4	MESS HALL	COMMUNICATION CENTER	17
5	INTERFEROMETER	CONCRETE SLAB	6
6	CONCRETE SLAB	CONCRETE SLAB	7
7	CONCRETE SLAB	DISPENSARY	22
8	VOLLEY BALL COURT	DOCK	1
9	WELL	GAS PUMP	18
10	POWER PLANT	INTERFEROMETER	5
11	SHOP	LAUNDRY	24
12	SHED	MESS HALL	4
13	AUTOMOTIVE MAINTENANCE PIT	OFFICES	19
14	SHOP	POWER PLANT	10
15	ANTENNA TOWER	QUARTERS	23
16	WATER TOWER	SHED	12
17	COMMUNICATION CENTER	SHOP	11
18	GAS PUMP	SHOP	14
19	OFFICES	SKY SCREEN	3
20-21-28	BARRACKS	STAND	2
22	DISPENSARY	STORE ROOM	26
23	QUARTERS	TOILET AND SHOWERS	25-27
24	LAUNDRY	VOLLEY BALL COURT	8
25-27	TOILETS AND SHOWERS	WATER TOWER	16
26	STORE ROOM	WELL	9

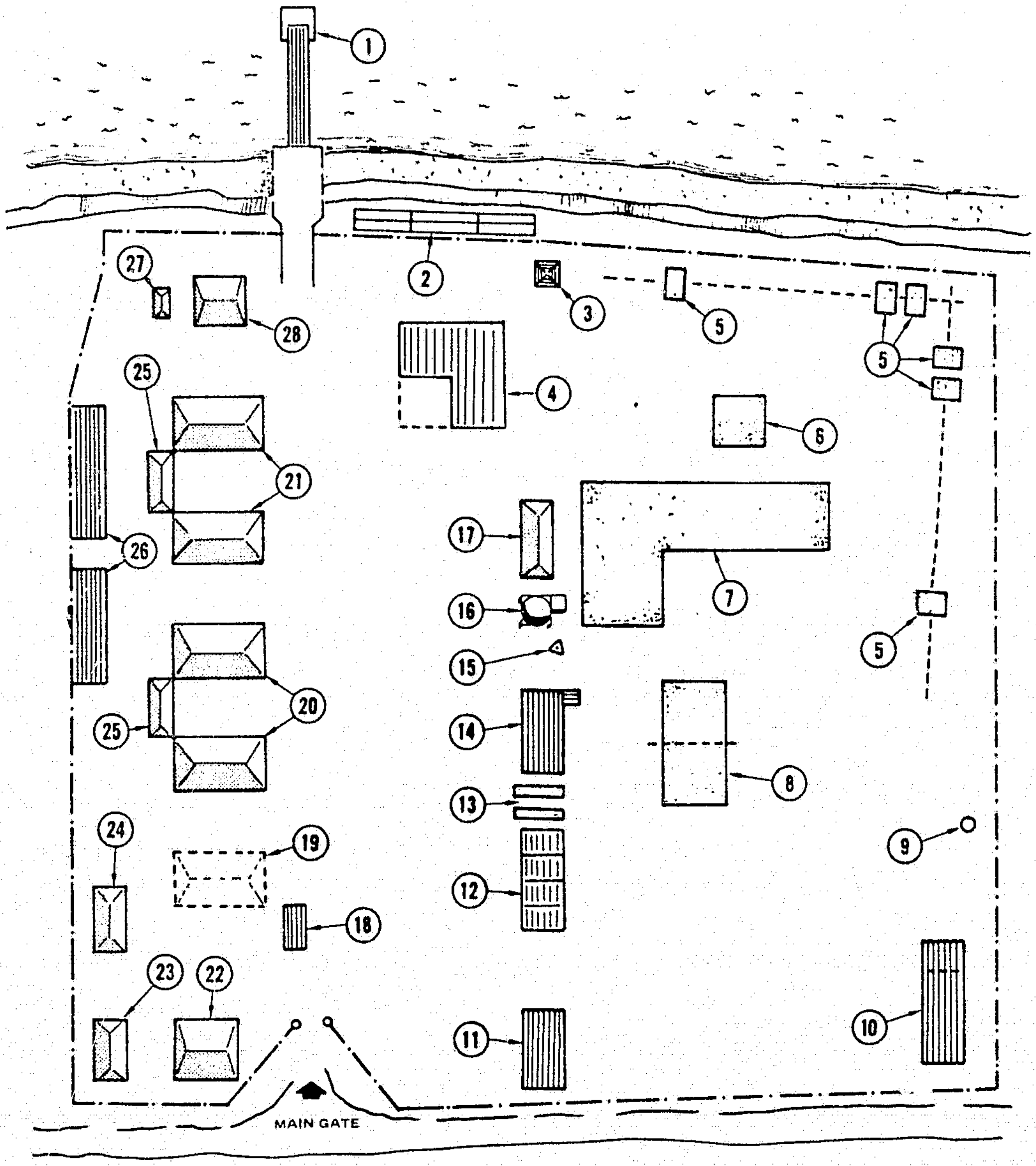


Figure 96.- Base Camp Layout.

(15) ANTENNA TOWER - This tower supports the radio antennas and a calibration unit for the MPS-26 Radar system.

(16) WATER TOWER - This is the tower and storage tank for the Base Camp water system. Living quarters for the Base Camp manager is located in the base of the tower.

(17) COMMUNICATION CENTER - This structure houses the VHF radio equipment.

(18) GAS PUMP - One unit is a gasoline pump for servicing vehicles; the other unit is a transfer pump used to transfer diesel fuel from the storage tanks to the generator tank and to the boat dock.

(19) OFFICES - This building is under construction and will provide additional office spaces.

(20) BARRACKS - Living quarters for Base Camp personnel.

(21) BARRACKS - Living quarters for Base Camp personnel.

(22) DISPENSARY - This is the Base Camp Dispensary equipped to handle first aid treatment.

(23) QUARTERS - This building provides living quarters for medical personnel.

(24) LAUNDRY - This building houses the laundry equipment.

(25) TOILETS AND SHOWERS - This building is equipped with modern toilets and showers.

(26) STORE ROOM - This is a general purpose storage area.

(27) TOILETS AND SHOWERS - This building is equipped with modern toilets and showers.

(28) BARRACKS - Living quarters for Base Camp personnel.

APPENDIX B

NASA/DOD AGREEMENT

APPENDIX B

SCOUT (SLV-1)

MEMORANDUM OF AGREEMENT
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
AIR FORCE SYSTEMS COMMAND

10 JANUARY 1970

This agreement will supersede the NASA/DOD Scout System Organizational Agreement and the Joint Operation Agreement for NASA/DOD Scout Launch Operations at PMR, both dated 21 June 1962 and the NASA/DOD Scout Agreement, dated 21 April 1969, effective 1 October 1970.

Concur:

Date: 16 JAN 1970
DAVID H. BARGER, Colonel, USAF
Deputy for Launch Vehicles
Space and Missile Systems
Organization (AFSC)

Concur:

Date:
EDGAR M. CORTRIGHT
Director, NASA LaRC

Approved:

Roy H. Worthington Jr.
Date: 9 MAR 70
ROY H. WORTHINGTON, JR.
Colonel, USAF
Director, Ballistics and Space Sys.
DCS/Systems
AFSC HQ

Approved:

V L Johnson
Date: 2/5/70
for DR. JOHN E. NAUGLE
Associate Administrator
Office of Space Science and
Applications
NASA HQ.

(Original on file at HQ NASA (SV) Wash., DC)

NASA/DOD SCOUT AGREEMENT

I. PURPOSE

This agreement establishes the responsibilities and working relationships of the Department of Defense and the National Aeronautics and Space Administration organizations involved in maintaining a Scout launch vehicle capability to satisfy the requirements of both agencies. This agreement supersedes the previous NASA/DOD Scout Agreement, dated April 21, 1969.

II. OBJECTIVES

The objectives of the NASA/DOD organizations described in this agreement are to:

A. Satisfy the launch vehicle requirements for those programs assigned to Scout.

B. Provide a standard, cost effective launch vehicle in the lower payload weight regime to perform space probe, atmospheric reentry, and earth orbit missions.

C. Maintain a Scout launch capability at the NASA Wallops Station and at Vandenberg Air Force Base.

III. POLICY

This agreement has been derived from the following basic policy guidelines for the joint use of the Scout program:

A. Mutual NASA and DOD agreement is necessary on decisions affecting the ability to fulfill mission requirements, joint funding or stated policy objectives of NASA or DOD.

B. It is advantageous to the Government to utilize single agency management for this program.

C. Single agency contracts will be utilized in the Scout program where recognizable economies can be realized without jeopardizing mission success.

D. A single logistics program will be provided to satisfy the total program requirements.

E. Standardized vehicle hardware, Aerospace Ground Equipment (AGE), and checkout procedures will be utilized to the maximum extent possible. Configuration control will be exercised to maintain standardization.

F. NASA will be responsible for maintaining a vehicle processing and launch capability at Wallops Station, Virginia and Vandenberg AFB.

G. DOD will be responsible for managing and supervising the vehicle processing and launch capability at Vandenberg AFB.

H. NASA will be responsible for managing and supervising the vehicle processing and launch capability at Wallops Station, Virginia.

IV. DEFINITIONS

The following definitions apply to the terms used in this agreement:

A. Scout launch vehicle system includes:

1. All flight components less payload.

2. All NASA/LTV furnished AGE required to prepare the vehicle for launch.

3. All facilities used in preparation and launch of the vehicle.

4. Spares for vehicle and AGE.

B. Payload - To be defined for each mission by the LTV Payload/Vehicle Interface Drawing.

C. Launch Agency - That organization which is primarily responsible for managing and supervising the operation and maintenance of the Scout vehicle system at the launch sites.

D. Mission Director - A designated program representative at the launch site. He has the authority for the final launch release after all launch vehicle systems are declared launch ready.

V. ORGANIZATION AND RESPONSIBILITIES

A. NASA/DOD Scout Coordinating Committee

The broad policy guidelines of the Scout launch vehicle system are established by the NASA/DOD Scout Coordinating

Committee. Decisions of this Committee will be implemented through designated NASA and DOD offices as outlined in this agreement. This Committee is composed of members representing NASA Headquarters, NASA Langley Research Center, Air Force Systems Command Headquarters, and Air Force Space and Missile Systems Organization (SAMSO) and will meet at frequent intervals to effect efficient program coordination. Chairman of this Committee will be the NASA Headquarters representative. Secretary will be the SAMSO representative. Specific Committee functions will include the following:

1. Definition of development objectives to achieve the growth and flexibility necessary to meet future mission requirements.

2. Conceptual configuration control of the Scout launch vehicle system.

3. Evaluation of mission requirements which would necessitate deviation from the standardized vehicle concept. Every reasonable effort will be exerted to negotiate a compromise which will permit accomplishment of mission objectives with minimum effect on the standard launch vehicle configuration.

4. Master System Scheduling: This will involve the establishment of production, point of vehicle assembly, and launch schedules to meet NASA and DOD mission requirements in the most economical and reliable manner.

5. Establishment of cost sharing agreements between DOD and NASA for procurement of the Scout launch vehicle system.

B. NASA Headquarters

This organization is responsible for NASA Scout program management and provides general NASA program requirements and forecasts. The Scout Program Manager at NASA Headquarters also serves as Chairman of the NASA/DOD Scout Coordinating Committee. In this function he is responsible for:

1. Translation of Committee decisions into program direction.

2. Management of NASA and DOD funds provided to support the Scout system. This will include the preparation of financial forecasts to indicate funding requirements for each of the participating programs.

C. NASA Langley Research Center

Within this organization the Scout Project Office has been designated as the office of primary responsibility for technical management of the Scout launch vehicle system. This office will be responsible for accomplishing the following specific tasks, as well as providing the technical and contractual management for the Scout system:

1. Incorporate decisions of the NASA/DOD Scout Coordinating Committee into the technical direction and contract management of the Scout Program.

2. Accomplish cost accounting and control of Scout assigned program funds.

3. For NASA and DOD missions prepare program and range documentation, establish mission requirements, and perform mission planning.

4. Conduct Mission Working Group Meetings to assure timely accomplishment of integration of payloads with the Scout vehicle and launch complex.

5. Identify Mission Director for NASA missions.

6. Provide launch services at Wallops Station and at Vandenberg Air Force Base.

7. Provide a qualified Scout launch team as required to support DOD programs.

8. Review NASA/DOD Scout Coordinating Committee recommendations for technical acceptability and furnish technical evaluations of proposed system changes to the Committee.

D. Air Force System Command Headquarters

This organization provides representation to the NASA/DOD Scout Coordinating Committee, general DOD program requirements and forecasts, and resources necessary to fulfill DOD responsibilities assigned by this agreement.

E. Air Force Space and Missile Systems Organization

Air Force Space and Missile Systems Organization is responsible for coordinating DOD missions, schedules, and vehicle configuration requirements; participating in meetings concerning

reliability, procedures, systems, reviews, etc.; managing and supervising the Vandenberg AFB contractor launch team; and providing a mission director for DOD missions.

F. SLV-1 Boosted Systems Office, 6595th Aerospace Test Wing

The 6595th ASTWg has been delegated the responsibility for management and supervision of the Vandenberg AFB contractor launch team. In this capacity, the 6595th ASTWg will:

1. Review and approve the Configuration Control Operating System for Scout, all contractor prepared range documentation, dress rehearsal and countdown procedures.

2. Provide a single point of contact for Air Force Western Test Range support.

3. Control access to Vandenberg AFB Scout facilities.

4. Participate in reliability, procedures and engineering meetings.

5. Provide the launch conductor for all Vandenberg AFB Scout launches.

6. Supervise the launch team safety program for Scout operations.

G. NASA Langley Research Center, Mission Support Office

This office represents the Langley Research Center in all Scout operations at Vandenberg AFB. This office is also assigned responsibility for:

1. Supervising and coordinating the activities of all NASA personnel assigned to Vandenberg AFB in support of the Scout program.

2. Supervising and coordinating the Vandenberg AFB portion of the Logistics Support System.

H. Joint NASA/DOD Scout Offices

1. The office at Vandenberg AFB is comprised of the Chief of the SLV-1 Boosted Systems Office, 6595th ASTWg, and the Head of the Langley MSO at Vandenberg AFB. Detailed operating

relationships will be described in a NASA/DOD Joint Operating Agreement for Scout Launch Operations at Vandenberg AFB, which will be developed within the bounds of this agreement. The responsibilities of this office include:

a. Assurance that all Scout system documentation is technically correct and in accordance with AFWTR requirements.

b. Coordination and submission of all vehicle documentation to AFWTR.

2. The Wallops Island office is comprised of designated representatives of the Scout Project Office and the Air Force Space and Missile Systems Organization for DOD launches from this site. The primary purpose of this office is to coordinate compliance with range requirements, schedules, range documentation, and "quick look" reports.

VI. VANDENBERG AFB ACCESS

All organizations are responsible for insuring that representatives of news media and/or foreign Governments are not allowed access to Vandenberg AFB operations except under provisions approved by both the Commander, ISTRAD (SAC) and the Commander, 6595th ASTWg (AFSC).

APPENDIX C

TYPICAL SCOUT-B WEIGHT BREAKDOWN

APPENDIX C

Typical Scout-B Weight Data. Example Used is S-175C.

SCOUT S-175C
DETAIL PRE-FLIGHT WEIGHT DATA

FOURTH-STAGE WEIGHTS	WEIGHT pounds	C.G. SCOUT STA. inches	MOMENT inch-pounds
Interim Total	997.75		52498
Interim Inert	386.60		12315
Items:			
1. Payload and Separation System			
a. Payload (SAS-A)	293.10	20.24	5932
b. Payload Attach Ring	0.00		
c. Hardware (Payload Attach Ring)	0.00		
d. Separation System Minus Items (b + c)	21.00	43.90	922
e. Electrolyte	0.00		
f. Explosive Bolts (Payload Separation System)	0.00		
g. Hardware (Separation System to Motor)	0.00		
2. Motor and Hardware			
a. ALTAIR FW-4S Motor (Inert) S/N 2223-10	53.55	70.55	3778
b. Ignition Harness	1.08	65.75	71
c. Tape (Install Ignition Harness)	0.00		
d. Reflective Tape or Paint	0.40*	65.75	26
3. Upper "D" Section			
a. Hardware (Upper "D" to Motor)	0.18	84.27	15
b. Upper "D" Structure + Harness	11.49	92.45	1062
c. Dynamic Balance Weights	0.90	92.45	83
d. Ballast Weights	4.90	86.70	425
Fourth-Stage Burnout	386.60	31.85	12315
4. Consumed Weight			
a. ALTAIR Motor Internal (Consumed)	611.15*	65.75	40183
Fourth-Stage Ignition	997.75	52.62	52498

* Estimated or Calculated Weight

THIRD-STAGE WEIGHTS

	WEIGHT pounds	C.G. SCOUT STA. inches	MOMENT inch-pounds
Interim Total	3372.05		546629
Interim Inert	769.95		128757
5. Lower "D" Section			
1) Spin Items			
a. Spin Table Structure + Components	25.13	100.96	2537
b. Explosive Bolts	0.53*	99.45	53
c. Spin Motors**	3.77*	101.58	383
d. Ring + Hardware (Spin Bearing Attachment)	1.70*	104.25	177
e. Inner Bearing Race	3.30*	103.88	343
2) Lower "D"			
a. Ring + Hardware (Spin Bearing to Lower "D")	2.95*	103.49	305
b. Outer Bearing Race	3.55*	103.88	369
c. Lower "D" + Components	205.00	116.87	23958
d. Electrolyte	1.82	115.75	211
e. IRP Installation + Hardware	21.12	112.35	2373
f. Tunnel Covers	0.50	128.75	64
g. Hardware (Tunnel Covers)	0.09	128.75	12
h. Hardware (Lower "D" to Motor)	0.35	131.10	46
6. Motor Section			
a. ANTARES X259 (Inert) S/N HIB-226	212.60	180.86	38451
b. Fillet	0.35*	191.15	67
c. Chamber Pressure Transducer	0.48*	121.75	58
d. Nozzle Tape	0.70*	224.95	157
e. Dome Tape	0.32*	193.95	62
f. Motor Tunnel (Telemetry)	3.45	157.71	544
g. Hardware (Motor Tunnel - Telemetry)	0.67	157.71	106
h. Motor Tunnel (Guidance)	3.45	157.71	544
i. Hardware (Motor Tunnel - Guidance)	0.67	157.71	106
j. Tunnel Harness (Telemetry)	10.10	169.52	1712
k. Hardware (Tunnel Harness - Telemetry)	0.40	169.52	68
l. Tunnel Harness (Guidance)	10.60	169.52	1797
m. Hardware (Tunnel Harness - Guidance)	0.39	169.52	66
n. Destruct Charges + Hardware	1.12*	179.20	201
o. Motor Nozzle Shroud + Hardware	8.95	224.05	2005

* Estimated or Calculated Weight

** Spin Motor Configuration: (2) 1.0KS40, (2) 1.0KS75

THIRD-STAGE WEIGHTS (Concluded)

	WEIGHT pounds	C.G. SCOUT STA. inches	MOMENT inch-pounds
7. Upper "C" Section			
a. Hardware (Upper "C" to Motor)	0.86	191.50	165
b. Upper "C" + Components	218.06	211.62	46146
c. Electrolyte	0.26	215.00	56
d. Safe Arm + Hardware	2.10	230.83	485
e. Static Balance Weights (225°)	0.32	203.00	65
f. Static Balance Weights (180°)	1.62	231.40	375
g. Nitrogen (Remaining)	1.00*	203.00	203
h. Hydrogen Peroxide (Remaining)	14.20*	203.00	2883
i. Tunnel Covers	7.30	215.00	1569
j. Hardware (Tunnel Covers)	0.17	215.00	37
Third-Stage Burnout	1767.70	102.54	181255
8. Consumed Weight			
a. ANTARES Motor Internal (Consumed)	2597.80*	160.52	416999
b. Hydrogen Peroxide (Consumed)	4.30*	203.00	873
Third-Stage Ignition	4369.80	137.11	599127

* Estimated or Calculated Weight

SECOND-STAGE WEIGHTS

		WEIGHT pounds	C.G. SCOUT STA. inches	MOMENT inch-pounds
	Interim Total	10641.94		3706041
	Interim Inert	2338.40		835955
9.	Nose Cone Heatshield			
	a. Heatshield (34, -25) S/N A-61	257.75	42.32	10908
	b. Explosives for Actuator	0.08	-17.00	-1
10.	Lower "C" Section			
	a. Diaphragm (Lower "C" to Upper "C")	27.50	238.18	6550
	b. Lower "C" + Components	55.00	243.22	13377
	c. Electrolyte	0.20	244.00	49
	d. Safe Arm Unit + Hardware	2.10	246.02	517
	e. Tunnel Covers	3.65	245.05	894
	f. Hardware (Tunnel Covers)	0.16	245.05	39
	g. Hardware (Lower "C" to Motor)	2.34	253.06	592
	h. Chamber Pressure Tube	0.23*	243.20	56
	i. Destruct Module + Battery	9.80	273.00	2675
11.	Motor Section			
	a. CASTOR II (Inert) S/N 180	1501.04*	390.84	586666
	b. Motor Tunnel (Telemetry)	10.20	347.71	3547
	c. Hardware (Motor Tunnel - Telemetry)	1.17	347.71	407
	d. Motor Tunnel (Guidance)	8.50	347.71	2956
	e. Hardware (Motor Tunnel - Guidance)	1.17	347.71	407
	f. Tunnel Harness (Telemetry)	21.16	359.21	7601
	g. Herdware (Tunnel Harness - Telemetry)	1.00	359.21	359
	h. Tunnel Harness (Guidance)	14.36	359.21	5158
	i. Hardware (Tunnel Harness - Guidance)	0.97	359.21	348
	j. Destruct Charges + Hardware	1.84	338.02	622
12.	Upper "B" Section			
	a. Hardware (Upper "B" to Motor)	1.53	437.56	669
	b. Upper "B" + Components	255.00	462.41	117915
	c. Tunnel Covers	7.05	468.00	3299
	d. Hardware (Tunnel Covers)	0.10	468.00	47
	e. Nitrogen (Remaining)	7.00*	455.00	3185
	f. Hydrogen Peroxide (Remaining)	147.50*	455.00	67113
	Second-Stage Burnout	6708.20	213.93	1435082

*Estimated or Calculated Weight

SECOND-STAGE WEIGHTS (Concluded)

		WEIGHT pounds	C.G. SCOUT STA. inches	MOMENT inch-pounds
13.	Consumed Weight			
	a. CASTOR II Internal (Consumed)	8266.04*	345.15	2853024
	b. Hydrogen Peroxide (Consumed)	37.50*	455.00	17063
	Second-Stage Ignition	15011.74	286.79	4305168
	FIRST-STAGE WEIGHTS			
	Interim Total	24899.92		16396142
	Interim Inert	3543.02		2505401
14.	CASTOR II Nozzle Plug	9.00*	453.60	4082
15.	Lower "B" Section			
	a. Diaphragm (Lower "B" to Upper "B")	68.50	486.66	33336
	b. Lower "B" + Components	97.75*	489.57	47855
	c. Electrolyte	0.20	508.00	102
	d. Safe Arm Unit + Hardware	2.10	508.00	1067
	e. Tunnel Covers	2.05	492.00	1009
	f. Hardware (Tunnel Covers)	0.04	492.01	20
	g. Hardware (Lower "B" to Motor)	0.99	495.80	491
	h. Chamber Pressure Tube	0.25*	489.90	122
	i. Destruct Module + Battery	9.40	508.00	4775
16.	Hoist Ring Installation			
	a. Hoist Ring	76.85	496.20	38133
	b. Hardware (Hoist Ring to Motor)	3.87	496.35	1921
17.	Motor Section			
	a. ALGOL IIB (Inert) S/N 66	2437.00*	692.20	1686891
	b. Destruct Charges + Hardware	3.31	646.05	2138
	c. Motor Tunnel (Telemetry)	17.10	652.14	11152
	d. Hardware (Motor Tunnel - Telemetry)	2.44	652.14	1591
	e. Motor Tunnel (Guidance)	15.85	652.14	10336
	f. Hardware (Motor Tunnel - Guidance)	2.45	652.14	1598
	g. Tunnel Harness (Telemetry)	22.59	653.05	14752
	h. Hardware (Tunnel Harness - Telemetry)	1.66	653.05	1084
	i. Tunnel Harness (Guidance)	22.41	653.05	14635
	j. Hardware (Tunnel Harness - Guidance)	1.65	653.05	1078
18.	Base "A" Section			
	a. Hardware (Base "A" to Motor)	2.97	809.90	2405
	b. Base "A" + Components	737.99	841.50	621019
	c. Electrolyte	2.55	842.00	2147
	d. Tunnel Covers	2.00	810.00	1620
	e. Hardware (Tunnel Covers)	0.05	815.00	41
	First-Stage Burnout	18554.76	367.05	6810569
19.	Consumed Weight			
	a. ALGOL IIB Internal (Consumed)	21356.90*	650.41	13890741
	First-Stage Ignition	39911.66	518.68	20701310

	WEIGHT poumds
Rev. A Payload (Total)	319.00 *
Fourth Step - Inert	67.60
Fourth-Stage Burnout	386.60
Fourth-Stage Consumed	611.15
Fourth-Stage Ignition	997.75
Third Step - Inert	769.95
Third-Stage Burnout	1767.70
Third-Stage Consumed	2602.10
Third-Stage Ignition	4369.80
Second Step - Inert (includes Heatshield)	2338.40
Second-Stage Burnout	6708.20
Second-Stage Consumed	8303.54
Second-Stage Ignition	15011.74
First Step - Inert	3543.02
First-Stage Burnout	18554.76
First-Stage Consumed	21356.90
First-Stage Ignition	39911.66

To obtain static step weights, the following applies:

Step 4 = Ign. 4 + Heatshield	1255.50
Step 3 = Ign. 3 - Ign. 4	3372.05
Step 2 = Ign. 2 - Ign. 3 - Heatshield + Nozzle Plug	10393.19
Step 1 = Ign. 1 - Ign. 2 - Nozzle Plug	24890.92
Total	39911.66

Rev. A * **Includes Spacecraft, Separation System, and Ballast Weights**

APPENDIX D

SYMBOLS USED IN THIS PUBLICATION

APPENDIX D

PRECEDING PAGE BLANK NOT FILMED

Explanation of symbols used throughout this publication for fiscal data.

FISCAL YEAR FUND EXPENDITURES CODE

NASA			INTERNATIONAL		AIR FORCE				NAVY	AEC	YR
DEV. & SRT	SEAM	PROD.	ESRO	UK	59-6 62-6 63-32	63-29	66-95	68-F 0071			
VA		PA			RA				NA		60-61
VB		PB			RB	YB			NB		62
VC		PC			RC	YC				TC	63
OD	SD	PD			RD	YD					64
OE	SE	PE			RE	YE					65
OF	SF	PF			RF	YF	NF				66
OG	SG	PG			RG		NG				67
OH	SH	PH					NH				68
OI		PI					NI	YI			69
OJ		PJ	EJ					YJ			70
		PK	EK								71
		PL	EL	UL							72
		PM	EM	UM							73

CODE

E - ESRO

N - NAVY (DIRECT & A.F. (66-95))

O - NASA-OSS-SRT (180)

P - NASA PRODUCTION (490)

R - AIR FORCE

S - NASA SYS. ENGR. & MAINT. (497-90)

T - AEC

U - UK-X4

V - NASA DEVELOPMENT FUND (890)

Y - NAVY BY AIR FORCE (63-29) and (68-F-0071)

A	1961
B	1962
C	1963
D	1964
E	1965
F	1966
G	1967
H	1968
I	1969
J	1970
K	1971
L	1972
M	1973

APPENDIX E

SCIENTIFIC RESEARCH TECHNOLOGY (SRT) DATA

APPENDIX E

SCIENTIFIC RESEARCH TECHNOLOGY DATA

The Scout Project Office also devoted itself to doing Research and Development programs related to solid propulsion technology and various Scout vehicle systems. The Office of Space Science (OSS) funded these programs under the 180-series RTOP. The work accomplished in this period consisted of the following projects.

(a) RTOP No. 180-05-01, Title: Destruct System Module, Monitor: S. J. Ailor.

Provided a qualified prototype auto-destruct module containing temperature and shock sensitive automatic destruct system components and wiring which can be mounted on the sides of a launch vehicle in line with wiring tunnels to afford greater protection from the ignition blast of upper stages on the Scout or other space vehicles. This provided a simple, compact, lightweight, accessible, and readily checkable, or replaceable, auto-destruct pod module containing all the sensitive components of the automatic destruct system for.a representative vehicle.

(b) RTOP No. 180-06-06 (180-06-52), Title: Launch Vehicle Concepts and Analysis, Monitor: S. J. Ailor.

Extended the successful design principles, experience, and operations technology of the Scout booster system by modifications which enhanced its previous capability and cost effectiveness. The broad study evaluated configurational changes in terms of performance, cost, and scheduled phase-in with the previous system. Also provided a trajectory analysis tool enabling a more rapid and realistic determination of the actual rocket motor performance. Off-nominal system performance or system constants were also revealed. This was of special value in evaluating new configurations. It also compared measured bending moments of the Scout vehicle during flight with moments calculated based on measured in-flight input parameters.

(c) RTOP No. 180-09-07, Title: Launch Vehicle Environmental Factors, Monitor: S. J. Ailor.

Developed a sensor to measure the accumulation and discharge of electrostatic potential existing between stages of a space vehicle during its flight environment. This information is of interest in defining the environment of vehicle electrical, electronic, or pyrotechnic systems. The measured parameters include magnitude of charge buildup during powered ascent of a Scout vehicle with emphasis on determination of potential discharge (wave front form) during first- and second-, and second- and third-stage separations (the latter occurring beyond the sensible atmosphere at an altitude of approximately 50 nautical miles).

(d) RTOP No. 180-11-03, Title: Launch Vehicle Structures, Monitor: C. A. Robins.

It was believed that payloads with larger diameters but weights that are consistent with the present performance capability represented

a potential group that could be accommodated by Scout. At least one payload user, DOD, expressed interest to the Scout office regarding the feasibility, cost, and effect on performance of a 44-inch payload diameter (48-inch external) heat shield. The Scout office had conducted preliminary analyses which showed that this larger heat shield was feasible considering both loads and stability. A program established requirements for design of a wind tunnel model and defined a detail plan for a test program at Langley Research Center. It also furnished structural rigidity and weight estimates for the proposed heat shield in order that such analyses and computer studies as appropriate could be performed to define the effect of flight loads on structural integrity and flexibility control system coupling. The results of the combined wind tunnel test program and associated analyses were reviewed and the results formed the basis for a statement of work for detailed analyses and design of a new heat shield by the vehicle contractor.

(e) RTOP No. 180-17-01 (180-17-50), Title: Astrionics Systems Evaluation, Monitor: C. H. Nelson.

A feasibility study was conducted that defined a guidance and control system concept for application to the final stage of a launch vehicle, based on trade-off studies, stability and control analyses, guidance and trajectory error evaluations, and a preliminary design utilizing the concept selected. Trade-off studies emphasized versatility of use in satisfying varied mission requirements, capability for improving vehicle overall performance accuracy, and minimal impact on vehicle interface changes, system weight, and cost of implementation. Also, a survey of industry and government agencies was conducted to determine the availability of a state-of-the-art inertial guidance (miniaturized gimbal or strap-down, conventional gyros or laser gyros) systems which could be utilized in launch vehicles and aircraft. Evaluation points were weight, volume, cost, ease of maintenance, reliability, and accuracy.

(f) RTOP No. 180-19-03 (180-19-50), Title: Reaction Control Systems, Monitor: E. C. Draley.

A study selected a thrust reduction method and identified the necessary modifications to a typical reaction control system relative to weight, space, and operation, including structural-control system coupling. Possible changes to a typical guidance system design and performance parameters as a result of the control system modifications were investigated. Also, design, development, and qualification for flight were done on a final stage solid rocket motor that enables a space launch vehicle to have a parking orbit capability. Study and demonstration were done on the rocket motor components, nozzle, case, propellant, and igniter to eliminate any degrading of these components during cool down and reheating of these components during the second firing. Design, development, and qualification were also done for the quench and re-ignition systems. This capability provides additional versatility of use in satisfying varied mission requirements with minimal impact on vehicle interface changes, system weight, and cost of implementation.

(g) RTOP No. 180-24-04 (180-24-52), Title: Launch Vehicle Instrumentation, Monitor: S. J. Ailor.

Investigated and evaluated performance of a complete FM/FM telemetry system under abnormal and transient environmental conditions. Sufficient data was generated to establish component time lag of a telemetry system both in airborne transmitting and ground receiving equipment. Previously, performance-type FM/FM telemetry was used on the Scout vehicle to obtain normal flight data. During a previous investigation of a flight failure of a motor, the failure mode indicated a need for determination of the behavior of end instruments and data transmission during period of weak signal strength, shock, high accelerations and other environmental characteristics of flight failures.

(h) RTOP No. 180-32-51, Tital: Solid Propellant Propulsion Systems, Monitor: E. C. Draley.

A review was made of the criteria and methods of analysis used in the design, processes, and techniques used in the fabrication of solid fuel rocket motors, particularly those used in the Scout vehicle, and identified those areas where the design and process controls were inadequate. A study was performed to define the extent and severity of the solid rocket motor outgassing. Optimum motor case materials and fabrication techniques were selected. An investigation was conducted to determine and verify by tests a technique for predicting the aerodynamic coefficients of control surfaces immersed in a rocket exhaust flow external to the nozzle. A study surveyed the existing motors, defined an optimum configuration for an upper-stage motor, and selected candidates as the starting point for development of the optimum motor. The Apollo standard initiator was qualified to a delay initiator assembly in a modular concept. In this concept, the Apollo standard initiator used higher level hermetically-sealed pyrotechnic assemblies. Separate motor delay initiator assemblies were developed to meet three different specified conditions. An investigation was made to evaluate the effectiveness of radiographic and ultrasonic nondestructive test methods currently used for determining the acceptance of solid propellant motors. Methods for upgrading the quality of nondestructive test acceptance criteria, through improvements in existing equipment and procedures, and the use of advanced techniques were also investigated. A development program conducted to determine the selection of an improved material to replace graphite materials currently used for nozzle throat inserts on solid propellant motors. A program identified the critical design parameters that affect the reliability of pyrotechnic systems so that low cost, simple, and reliable systems could be used.

(i) RTOP No. 180-59-04, Title: Vehicle Launch Operations Techniques, Monitor: J. R. Hall.

Investigated the desirability of cocooning assembled flight vehicles in near flight-ready condition. The purpose was to reduce cost

by smoothing production rate to improve reliability by reducing handling and controlling environment during storage, to provide rapid response to payload requirements and to reduce cost and time of field processing. The possibility of eliminating or reducing telemetered diagnostic measurements and system checkout on the pad was investigated. Applicability of the study applied to all small solid propellant configurations but was based on Scout data. The detailed study identified problems associated with cocooned storage of space vehicle hardware and established conceptual designs of mechanical and electronic equipment necessary to support a cocooning operation.

Table CCXXIII itemizes the historical data of each program.

Table CCXXIV lists the funding for each of these research programs.

The published reports of this research are included in the Bibliography of Appendix H.

Funding was received from OSS as itemized below. Tables CCXXV through CCXXVII document the expenditures for each fiscal year.

TABLE CCXIII - SCOUT PROJECT OFFICE-SRT(180)
(Progress Report)

NEW NO.	OLD NO.	TITLE	J.O. RAS-	PURCHASE REQUEST	WORK STATEMENT	PROPOSAL	NEGOTIATED	CONTRACT	FY FUNDS	MANAGER	FINAL COST	FINAL REPORT	COMPLETE
[illegible]	03-03-02	Pressure Vessel Research							71	R. Keynton	NONE		Canceled
	05-01-01	Destruct Module	132	Yes	Yes	59,728	Yes	NAS1-3899-T17	65	L. Forrest	82,[illegible]	Yes	Yes
	06-01-05	Computer Program (TOLIP)	131	Yes	Yes	13,160	Yes	NAS1-5106	65-66	D. Eide	[illegible]	Yes	Yes
06-52-01	06-04-01	Translunar Trajectory	189	NO				NO	73	R. Keynton	NONE		Canceled
06-52-02	06-06-07	Upgraded Scout	142	Yes									
		Fifth Stage	142	Yes	Yes	51,569	Yes	NAS1-3899-T37	66	S. Wagner	[illegible]	Yes	Yes
		44-inch First Stage	142	Yes	Yes	199,871	Yes	NAS1-6935-1	66-67	R. Schultz	[illegible]	23,3[illegible]	Yes
		Minuteman First Stage	142	Yes	Yes	218,893	Yes	NAS1-6935-8	68-69	L. Foster	[illegible]	[illegible]-17-67	Yes
		Castor B-Sect.,1st Stg.Sep.Sys.	180	No				NO	73	S. Ailor	NONE		Canceled
		Updating PAPS CR-336	142	Yes	Yes	21,800	Yes	NAS1-6935-28	68-69	D. Crowder	16,[illegible]	23,4[illegible]	Yes
	06-06-08	Error Analysis	151	Yes	Yes	241,874	Yes	NAS1-6969	66	D. Eide	109,115	Yes	Yes
06-52-03	06-06-09	Trajectory Reconstruction	181	Yes	Yes	Yes	Yes	NAS1-9204	68-71	D. Eide	[illegible]	[illegible]	Yes
06-52-04	N/A	Launch Vehicle Flight Loads							72-74	R. Steiner			Canceled
06-52-06	N/A	Instrmnt.Atmosphr. Effect on Traj.							73-74	S. Ailor			Canceled
06-52-07	N/A	Grnd.& Flt.Instrmnts.for Traj.Recon.	181						74	S. Ailor			
06-52-09	N/A	Advanced Scout Capabilities							75	S. Ailor			
	09-07-01	Electrostatic Tests	134	Yes	Yes	53,864	Yes	NAS1-3899-19	65	S. Ailor	[illegible]	Yes	Yes
	11-03-01	Large Heat Shield	178	Yes	Yes	128,283	Yes	NAS1-6935-24	69	P. Shea	75,[illegible]	23,411	Yes
	17-01-01	Azimuth Errors	155	Yes	Yes	172,893	Yes	NAS1-5592-4	66	J. Allen	117,[illegible]	Yes	Yes
17-50-01	17-01-02	Final Stage Control	187	Yes	Yes	53,735	Yes	NAS1-10000-R6	72	S. Ailor	53,75[illegible]		Yes
17-50-02	17-05-06	Inertial Guidance	198	Yes	Yes	65,805	Yes	NAS1-10504	71-72	S. Ailor	65,805	CR20[illegible]	Yes
		Guidance Study	198	Yes	Yes		Yes	NAS1-10000-R13	69-73	S. Ailor			
	19-03-02	Roll-Yaw Compensation, Part I	152	Yes	Yes	127,339	Yes	NAS1-5592	66	D. Foster	85,[illegible]	Yes	Yes
		Roll-Yaw Compensation, Part II	152	Yes	Yes	104,128	Yes	NAS1-6935-5	67-68	S. Ailor	99,780	[illegible]	Yes
		Design Review R/Y Comp. Unit	152	Yes	Yes	43,707	Yes	NAS1-6935-30	69	D. Foster	25,675	[illegible],413	Yes
	19-03-03	Deadband Integrator	166	No				No		S. Ailor	NONE		Canceled
	19-03-04	Headend Steering	167	No				No		C. Robins	NONE		Canceled
19-50-01	19-03-05	Coast Control	176	Yes	Yes	69,376	Yes	NAS1-6935-17	69-71	S. Ailor	57,[illegible]	[illegible]	Transfer-red to 490
19-50-02	19-03-06	Stop-Restart Solid Motor		No				No	72	D. Crowder	NONE		Canceled
	24-04-01	S-Band Antenna	168	Yes	Yes	123,008	Yes	NAS1-6935-1[illegible]	67	S. Ailor	118,088	[illegible]	Yes
	24-04-02	Solid State Switching	N/A						69	S. Ailor			Canceled
24-52-02	24-04-03	Instrument Response	170	Yes	Yes	75,000	Yes	NAS1-8641	67-70	S. Ailor	127,781	AVSD-[illegible]	Yes
32-51-01	32-04-02	Outgassing Effects on Payload	199	Yes	Yes	33,592	Yes	NAS1-10263	71	D. Crowder	33,[illegible]	CR[illegible]	Yes
	32-05-02	X-258 Propellant	HQS	HQS	HQS	HQS	HQS	NASW-1251	65	S. Wagner	27[illegible]		Yes
	32-05-03	FW4S Propellant	RJJ-226	Yes	Yes	Yes	No	No		W. Swain	NONE	[illegible]	Canceled
	32-05-04	Accuracy Prediction	129	Yes	Yes	Yes	Yes	NAS1-3683-4-5	64-65	D. Eide	[illegible]	[illegible]	Yes
	32-05-06	Fifth-Stage Motor (Design Review)		No				No		D. Crowder	NONE		Canceled
	32-05-07	Improve Solid Motors	182	Yes	Yes	Yes	Yes	NAS1-6935-23	69	D. Crowder	60,[illegible]	[illegible]	Yes
	32-07-05	Spin Motors	121	Yes	Yes	111,406	Yes	NAS1-3899-T18	65	D. Smith	106,000	Yes	Yes
	32-07-10	Algol Pyrogen	144	Yes	Yes	Yes	Yes	NAS1-5592-7	66	F. Cromie	250,000	Yes	Yes
32-51-03	32-07-11	ASI Prog., Stages 1 & 2	158	Yes	Yes	74,312	Yes	NAS1-6935-14	67-68	D. Crowder	67,760	No	Yes
		ASI Prog., Stages 3 & 4	158	Yes	Yes	Yes	Yes	NAS1-5592	67	D. Crowder	203,828	[illegible]	Yes
		Rework Initiator Cartg. Assys.	158	Yes	Yes	4,807	Yes	NAS1-6935-31	69-71	D. Crowder	6,987	No	Yes
32-51-04	32-07-13	NDT Technique, Motors	401 169	Yes	Yes	Yes	Yes	NAS1-8994	68-71	D. Crowder	230,304	CR-2013	Yes
32-51-05	32-07-14	Pyrotechnic Designs RAS-403,	RUE-124	Yes	Yes	Yes	Yes	NAS1-10988	72-75	L. Bement			
	32-08-04	Photomechanical Algol	130	Yes	Yes	Yes	Yes	NAS1-3975	65	H. McComb	64,268	Yes	Yes
32-51-06	32-08-05	New Nozzle Insert	179	Yes	Yes	56,110	Yes	NAS1-6935-20	69-70	D. Crowder	257,813	23,41[illegible]	Yes
32-51-07	32-08-06	Nozzle Material	RQO-117 TGO-108	Yes	Yes	Yes	Yes	NGR34-002-108 NAS1-9229	68-75	W. Higginbotham			
	32-09-01	X-259 Load Tests	155	Yes	Yes	103,907	Yes	NAS1-3899-T43	65-66	L. Forrest	99,8[illegible]	Yes	Yes
	32-09-02	Fiberglas Case	156	Yes	Yes	Yes	Yes	NAS1-6367	67	E. VanLandingham	100,000	Yes	Yes
32-51-08	32-35-01	Jet Vane Effectiveness	186	Yes	Yes	118,860	Yes	NAS1-6935-34	70	R. Keynton	146,925	25,465	Yes
		Dev. & Qual. Base A Jet Vanes	186	Yes	Yes	85,394	Yes	NAS1-6935-42	70	E. Hall	42,250	Yes	Yes
32-51-09	N/A	Eject Exit Cone Liner							73	D. Crowder			Canceled
32-51-11	N/A	Nozzle Optimization Study							73	D. Crowder			Canceled
32-51-12	N/A	Capacitive Disc.Pyro.Init.Syst.	403	Yes	Yes	75,000	Yes	NAS1-10000	73	J. Allen	72,585	Yes	
	59-04-01	Cocooning	154	Yes	Yes	67,695	Yes	NAS1-6748	67	L. Foster	61,535	Yes	Yes
	66-04-01	Pitch-up	165	Yes	Yes	62,258	No	No		D. Eide	NONE	No	Canceled

TABLE CCXXIV - SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

OLD NO.	NEW NO.	DESCRIPTION	FY 1965 & Prior	FY 1966	FY 1967	FY 1968	FY 1969	FY 1970	FY 1971	TOTAL OBLIGATED
05-01-01C		Destruct Module (RAS132)	$ 87,467	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 87,467
06-01-05C		Computer Program (RAS131)	90,500	12,995	0	4,950	0	0	0	108,445
06-06-07	06-52-02	Upgraded Scout (RAS142)(RAS180)	0	193,235	51,572	5,090	10,910	185	0	260,992
06-06-08C		Error Analysis (RAS151)	0	198,700	192	223	0	0	0	199,115
06-06-09	06-52-03	Trajectory Reconstruction (RAS181)	0	0	0	57,760	16,028	2,400	29,076	105,264
06-50-02		Orbit Determination	0	0	0	0	0	0	4,653	4,653
09-07-01C		Electrostatic Tests (RAS134)	77,276	2,451	0	0	0	0	0	79,727
11-03-01		Large Heat Shield (RAS178)	0	0	0	111	0	73,389	0	73,500
17-01-01C		Azimuth Errors (RAS155)	0	117,042	0	0	0	0	0	117,042
17-01-02	17-50-01	Upper Stage Control (RAS187)	0	0	0	0	0	0	47,265	47,265
17-05-05	17-50-02	Guidance System Investigation (RAS198)	2,435	10,224	0	0	0	0	74,146	86,805
19-03-02C		Roll and Yaw Compensation (RAS152)	0	81,244	4,374	99,779	25,675	0	0	211,072
19-03-05	19-50-01	Coast Control (RAS176)	0	0	0	0	0	57,575	0	57,575
24-04-01C		S-Band Antennae (RAS168)	0	0	118,088	0	0	0	0	118,088
24-04-03	24-52-02	Instrument Response (RAS170)	0	0	59,943	4,958	0	62,880	0	127,781
32-04-02	32-51-01	Payload Contamination (RAS199)	0	0	0	0	0	0	33,448	33,448
*32-05-02C		X-258 Propellant (Direct OSSA)	274,290	4	0	0	0	0	0	274,294
32-05-04C		Accuracy (RAS129)	346,300	0	0	0	0	0	0	346,300
32-05-06		Velocity Package Motor Improvement	0	0	0	0	0	0	0	0
32-05-07	32-51-02	Rocket Design (RAS182)	0	0	0	0	11,879	49,071	0	60,950
32-07-05C		Spin Motors (RAS121)	106,000	0	0	0	0	0	0	106,000
32-07-08	32-09-01C	X-259 Load Tests (RAS133)	75,822	23,805	0	0	0	0	0	99,627
32-07-10C		Algol Pyrogen (RAS144)	0	250,000	0	0	0	0	0	250,000
32-07-11	32-51-03	Apollo Initiators (RAS158)	0	232	254,296	12,167	7,005	9,391	1	283,092
32-07-13	32-51-04	Nondestructive Test Techniques (RAS169)	0	0	0	195,165	674	53,791	15,000	264,630
32-07-14	32-51-05	Pyrotechnic Study (RUE124)	0	0	0	0	30,000	71,975	80,458	182,433
32-08-04C		Photomechanical Algol (RAS130)	64,200	68	0	0	0	0	0	64,268
32-08-05	32-51-06	Improved Nozzle Material (RAS179)	0	0	2,084	18,000	199,000	35,715	5,438	260,237
32-08-06	32-51-07	Nozzle Material Evaluation (TGD108)(RQ0110)	0	0	0	2,781	80,704	47,985	168	131,638
32-09-02C		Fiberglass Case (RAS156)	0	0	100,000	0	0	0	0	100,000
32-35-01	32-51-08	Jet Vane Study (RAS186)	0	0	0	16	32,125	157,034	0	189,175
59-04-01C		Cocooning (RAS154)	0	0	59,451	0	0	0	0	59,451
		TOTAL OBLIGATED	$1,124,290	$890,000	$650,000	$401,000	$414,000	$621,391	$289,653	$4,390,334
		UNOBLIGATED	0	0	0	0	0	0	0	0
		TOTAL FUNDED	$1,124,290	$890,000	$650,000	$401,000	$414,000	$621,391	$289,653	$4,390,334

---

*OSS - Direct Funding, Contract NASW-1241.
C-Complete.
( ) - Proposed (thousands dollars).

SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

TABLE CCXXV - SRT (OSS) FUNDING FOR FY 1964.

		OBLIGATED
180-32-		
*180-32-05-04	ACCURACY PREDICTION STUDY RAS129 (CR336)	
	60.400.038 NAS1-3683-1 LTV	$ 98,501
	60.400.040 NAS1-3684 Thiokol	16,499
TOTAL FY64 SRT		$115,000

TABLE CCXXVI - SRT (OSS) FUNDING FOR FY 1965.

180-05-		
180-05-01-01	DESTRUCT SYSTEM MODULE RAS132(LTV 203-205)	
	60.400.091 NAS1-3899-T17 LTV	$ 57,037
	60,400.312 NAS1-3899-T17-2(c1)	6,000
	60.400.346 NAS1-3899-T17-2(c2)	4,889
	60.400.347 NAS1-3899-T17-3 LTV Overrun	7,541
	60.400.424 NAS1-3899-T17-3 LTV Overrun	12,000
	SUBTOTAL 180-05	$ 87,467
180-06-		
180-06-01-05	PERFORMANCE DISPERSION COMPUTER PROGRAM RAS131	
	60.400.162 NAS1-5106 Lockheed (CR66515)	$ 90,500
180-09-		
180-09-07-01	ELECTROSTATIC FLIGHT MEASUREMENT RAS134 (CR477)	
	60.400.184 NAS1-3589-10 LTV	$ 34,022
	60.400.179 NAS1-3899-T19 LTV	35,000
	60.400.245 NAS1-3899-T19 LTV	8,254
	SUBTOTAL 180-09	$ 77,276
180-17-		
180-17-50-02	GUIDANCE SYSTEM INVESTIGATION RAS198	$ 2,435
	60.400.931 NAS1-10000-R-13 LTV	

---

*Obligated as 180-32-07-06.

SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

TABLE CCXXVI Concluded - SRT (OSS) FUNDING FOR FY 1965.

180-32-		OBLIGATED
180-32-05-04	ACCURACY PREDICTION STUDY RAS129 (CR336)	
	60.400.035 NAS1-3685-1 Aerojet	$ 13,336
	60.400.040 NAS1-3684 Thiokol	23,595
	60.400.041 NAS1-3685 Aerojet	18,066
	60.400.042 NAS1-3686 Hercules	10,731
	60.400.284 NAS1-3684-2 LTV	9,077
	60.400.205 NAS1-3683-2 LTV	13,500
	60.400.225 NAS1-3683-2 LTV	16,800
	60.400.497 NAS1-3685 Aerojet	45,548
	60.400.496 NAS1-3684 Thiokol	44,000
	20.200.498 NAS1-3686 Hercules	27,578
	20.200.696 NAS1-3685-1 Aerojet	9,069
	SUBTOTAL 180-32-05-04	$231,300
*180-32-08-04	PHOTOMECHANICAL ALGOL INVESTIGATION RAS130 - RDK233(CR66026)	
	20.200.602 NAS1-3975 Allied Res. Assoc.	$ 39,200
	23.710.011 NAS1-5191 Allied Res. Assoc.	25,000
	SUBTOTAL 180-32-08-04	$ 64,200
180-32-07-05	SPIN MOTOR IMPROVEMENT RAS121 (CR359)	
	20.200.592 NAS1-3899-T18 LTV	$106,000
180-32-09-01	X-259 LOAD AND STATIC TESTS RAS133 (LTV 23.276)	
	60.400.321 NAS1-3899-T43 LTV	$ 75,822
	SUBTOTAL 180-32	$477,322
SUBTOTAL FY65 SRT-LRC		$735,000
OSS-180-32 DIRECT WITH ABL (NASW-1241)		274,290
TOTAL FY65 SRT		$1,009,290

---

*By Structures Research Division.

SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

TABLE CCXXVII - SRT (OSS) FUNDING FOR FY 1966.

		OBLIGATED
180-06-		
180-06-01-05	PERFORMANCE DISPERSION COMPUTER PROGRAM RAS131	
	60.400.692 NAS1-5106 Lockheed	$ 10,000
	60.400.735 NAS1-5106 Lockheed	2,995
180-06-06-08	ERROR ANALYSIS RAS151	
	60.400.608 NAS1-6969 TRW	125,000
	60.400.680 NAS1-6969 TRW	73,700
180-06-52-02	UPGRADING THE SCOUT VEHICLE RAS142	
(06-07)	61.440.004 NAS1-3899-T37 LTV - 5th Stage	$ 39,195
	60.400.562 NAS1-6935-1 LTV 44-Inch Algol (CR66545)	83,200
	60.400.713 NAS1-6935-8 LTV Minuteman 1st Stg.Stdy. (23.376)	70,840
	SUBTOTAL 180-06	$404,930
180-09-		
180-09-07-01	ELECTROSTATIC FLIGHT MEASUREMENT RAS134 (CR477)	
	NAS1-3589-10 Overrun LTV	$ 0
	01.030.020 NAS1-3589-230 Audit Services	51
	60.400.553 NAS1-3493-6(c8) HPC-Discharge Test	2,400
	SUBTOTAL 180-09	$ 2,451
180-17-		
180-17-01-01	AZIMUTH ERRORS RAS155 (LTV 23.342)	
	60.400.548 NAS1-5592-4 LTV	$ 70,000
	60.400.618 NAS1-5592-4 LTV	47,042
180-17-50-02	GUIDANCE SYSTEM INVESTIGATION RAS198	$ 10,224
	60.400.931 NAS1-10000-R-13 LTV	
	SUBTOTAL 180-17	$127,266
180-19-		
180-19-03-02	ROLL & YAW COMPENSATION RAS152 (CR1209)	
	60.400.564 NAS1-5592-6 LTV (Roll)	$ 58,696
	60.400.637 NAS1-5592-6 LTV (Yaw)	25,000
	60.400.637 NAS1-5592-9 LTV (Yaw)	-(2,452)
	SUBTOTAL 180-19	$ 81,244

SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

TABLE CCXXVII Concluded - SRT (OSS) FUNDING FOR FY 1966.

180-32-		OBLIGATED
180-32-05-02	L-15974 (ADB100) Stock Issues	$ 4
180-32-07-10	ALGOL IGNITER IMPROVEMENT RAS144	
	60.400.566 NAS1-5592-7 LTV	150,000
	60.400.628 NAS1-5592-7 LTV	100,000
180-32-08-04	PHOTOMECHANICAL ALGOL INVESTIGATION RDK233 (CR66026)	
	01.030.020 NAS1-5191 Audit Services-173	68
180-32-09-01	X-259 LOAD AND STATIC TESTS RAS133 (LTV 23.276)	
	60.400.321 NAS1-3899-T43 LTV	14,758
	60.400.527 NAS1-4795-4(cl) Tunnel Tabs	800
	60.400.580 NAS1-4795-4-1(cl) Tunnel Tabs	1,000
	60.400.654 NAS1-3899-T43 LTV	7,247
180-32-51-03	APOLLO INITIATORS RAS158	
(07-11)	60.400.855 NAS1-6935-14 LTV (Second Stage)	232
	SUBTOTAL 180-32	$274,109
TOTAL FY 1966 SRT		$890,000

SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

TABLE CCXXVIII - SRT (OSS) FUNDING FOR FY 1967.

		OBLIGATED
180-06-		
180-06-52-02	UPGRADING THE SCOUT VEHICLE RAS142	
(06-07)	60.400.713 NAS1-6935-8 LTV Minuteman 1st Stg.	$ 51,460
	Stock Issues L-15974 ADB100	112
180-06-06-08	ERROR ANALYSIS RAS151	
	45.110.051 NAS1-6969 (619) DCASO	192
180-19-		
180-19-03-02	ROLL YAW COMPENSATION RAS152 (CR1209)	
	60.400.873 NAS1-6935-10 LTV	4,374
180-24-		
180-24-04-01	S-BAND ANTENNAE RAS168	
	60.400.737 NAS1-6935-10 LTV	118,088
180-24-52-02	INSTRUMENT RESPONSE RAS170 (CR1768)	
(04-03)	60.400.820 NAS1-8541 AVCO	59,943
180-32-		
180-32-09-02	FIBERGLASS CASE DAMAGE RAS156 (AMPD)(CR66813-4-5)	
	60.400.782 NAS1-6367 Hercules Powder Co.	100,000
180-32-51-03	APOLLO INITIATORS RAS158 (LTV 23.489)	
(07-11)	60.400.565 NAS1-5592-5 LTV (3 and 4 Stages)	78,304
	60.400.711 NAS1-5592-12 LTV (3 and 4 Stages)	29,883
	60.400.555 NAS1-5592-2(c2) LTV(Explosive Bolts)	24,800
	60.400.628 NAS1-5592-7 LTV (First Stage)	60,026
	60.400.792 NAS1-6935-14 LTV (Second Stage)	50,000
	60.400.812 NAS1-5592-14 LTV (3 & 4 Stages)	9,300
	60.400.855 NAS1-6935-14 LTV (Second Stage)	468
	60.400.843 NAS1-5592-14 LTV (3 & 4 Stages)	1,515
180-32-51-06	IMPROVED NOZZLE MATERIAL RAS179 (LTV 23.550)	
(08-05)	66.000.220 NAS1-10500-2-1	2,084
180-59-		
180-59-04-01	COCOONING RAS154 (CR-66321)	
	45.110.051 NAS1-6748 (566)(567) DCASO	272
	60.400.617 NAS1-6748 LTV Study	59,179
TOTAL FY 1967 SRT		$650,000

SRT (OSS) RESEARCH PROGRAMS
(180 Funds)

TABLE CCXXIX - SRT (OSS) FUNDING FOR FY 1968.

		OBLIGATED
180-06-		
180-06-01-05	COMPUTER PROGRAM RAS131	
	60.400.834 Lockheed L20692 (Consultant)	$ 2,500
	60.400.842 Lockheed L20692 (Consultant)	2,450
180-06-52-02	UPGRADING THE SCOUT VEHICLE RAS142	
(06-07)	60.400.932 NAS1-6935-28 LTV (Updating CR336)	5,090
180-06-06-08	ERROR ANALYSIS RAS151	
	60.400.826 NAS1-6969-1 TRW (Redirection)	223
180-06-52-03	TRAJECTORY RECONSTRUCTION RAS181 (LMSC-D030985)	
(06-09)	60.400.868 NAS1-9204 Lockheed	57,760
180-11-		
180-11-03-01	LARGE HEAT SHIELD RAS178	
	60.400.928 NAS1-6935-24 LTV	111
180-19-		
180-19-03-02	ROLL YAW COMPENSATION RAS152 (CR1209)	
	60.400.721 NAS1-6935-5 LTV	97,380
	60.400.873 NAS1-6935-10-3 LTV	2,399
180-24-		
180-24-52-02	INSTRUMENTATION RESPONSE RAS170 (CR1768)	
(04-03)	NAS1-7256 Shipping	13
	60.900.031 NAS1-8541-3 AVCO	4,945
180-32-		
180-32-51-03	APOLLO INITIATORS RAS158 LTV (23.489)	
(07-11)	60.400.855 NAS1-6935-14 LTV (Second Stage)	17,060
	60.400.855 NAS1-6935-14-6 LTV	-4,903
	NAS1-7256 Shipping	10
180-32-51-04	NONDESTRUCTIVE TEST TECHNIQUES RAS169	
(07-13)	60.400.817 NAS1-8994 G.E.	195,162
	60.900.118 NAS1-10482	3
180-32-51-06	IMPROVED NOZZLE MATERIAL RAS179 (LTV 23.550)	
(08-05)	60.400.876 NAS1-6935-20 LTV	18,000

SSRT (OSS) RESEARCH PROGRAMS
(180 Funds)

TABLE CCXXIX Concluded - SRT (OSS) FUNDING FOR FY 1968

		OBLIGATED
180-32-Continued		
180-32-51-07 (08-06)	NOZZLE MATERIAL EVALUATION TGD 108	
	L-15974 ADB100 Stock Issues	$ 40
	43.400.622 L-32768 Lecture Consultant	340
	L-32768 Shipping	6
	55.210.435 L-33317 Tubing	199
	52.420.850 L-33948 Tungsten Element	585
	55.210.443 L-34285 Argon Gas	75
	56.130.469 L-42568-1 Air Filter	610
	52.310.110 L-44095 Fuses	29
	55.210.560 L-45688 Book	9
	55.210.565 L-52058 High Vacuum Equip. Sys.	3
	52.220.695 L0852220695 Machining GFE	671
	52.410.287 L1352410287 Wheel	48
	55.210.559 L3855210559 Cutting Head	152
	NGR34002108 Shipping	14
180-32-51-08 (35-01)	JET VANE INVESTIGATION RAS186	
	52.340.193 L-48486 Seal Fittings	16
TOTAL FY 1968 SRT		$401,000

SRT (OSS) RESEARCH PROGRAMS
(180 Funds)

TABLE CCXXX - SRT (OSS) FUNDING FOR FY 1969.

		OBLIGATED
180-06-		
180-06-52-02	UPGRADING THE SCOUT VEHICLE RAS142, RAS180	
(06-07)	60.400.932 NAS1-6935-28 Updating CR-336 LTV	$ 10,910
180-06-52-03	TRAJECTORY RECONSTRUCTION RAS181 (LMSC-D030985)	
(06-09)	NAS1-9204 Shipping	28
	66.000.028 NAS1-9204-3 Lockheed	16,000
180-19-		
180-19-03-02	ROLL YAW COMPENSATION RAS152	
	60.400.945 NAS1-6935-30 LTV	25,675
180-32-		
180-32-51-02	ROCKET DESIGN RAS182	
(05-07)	60.400.867 NAS1-6935-23 LTV	11,879
180-32-51-03	APOLLO INITIATORS RAS158 (LTV 23.489)	
(07-11)	60.400.937 NAS1-6935-31 LTV	4,807
	60.400.951 NAS1-6935-31 LTV	2,468
	60.400.951 NAS1-6935-31-1 LTV	-206
	60.400.951 NAS1-6935-31-2 LTV	-82
	NAS1-7256 Shipping	18
180-32-51-04	NONDESTRUCTIVE TEST TECHNIQUES RAS169(CR2013)	
(07-13)	60.900.118 NAS1-10482	674
	NAS1-8994 G.S. (CR2013)	
180-32-51-05	PYROTECHNIC STUDY RUE124	
	65.120.049 L-66149 Precision Calorimeter (Harry Diamond Co.)	30,000
180-32-51-06	IMPROVED NOZZLE MATERIAL RAS179 (LTV 23.550)	
(08-05)	60.400.876 NAS1-10500-2 LTV	99,897
	66.000.039 NAS1-10805 G.E.	99,103
180-32-51-07	NOZZLE MATERIAL EVALUATION TGD108	
(08-06)	ADB100 L-15974 Stock Issues	13
	55.210.435 L-33317 Tubing	17
	55.210.448 L-35992 Aluminum Oxide Tubes	250
	55.210.451 L-36457 Tantalum Metal	433
	55.210.454 L-36620, L-36622 Graphite	1,373
	55.210.453 L-36850 Tantalum Metal	198
	55.210.461 L-36863 Tantalum Metal	183
	55.210.467 L-37024 Aluminum Oxide Tube	252
	L-37024 Shipping	1

SRT (OSS) RESEARCH PROGRAMS
(180 Funds)

TABLE CCXXX Concluded - SRT (OSS) FUNDING FOR FY 1969.

		OBLIGATED
180-32- Continued		
180-32-51-07	NOZZLE MATERIAL EVALUATION TGD108 Cont'd	
(08-06)	55.210.470 L-37422 Tubing	$ 236
	55.210.471 L-37423 Wire	208
	43.400.718 L-37646 Lecture Consultant	370
	55.210.484 L-37840 Tubing	257
	43.400.741 L-38007 Lecture Consultant	175
	55.210.498 L-39588 Tubes	235
	55.120.008 L-39597 Access., Testing Machine	2,220
	55.210.499 L-39629 Tantalum Metal	604
	55.210.523 L-43113 Wire	41
	55.210.526 L-43908 Heating Element Tube	240
	52.410.412 L-46049 Gloves	61
	55.210.565 L-52058 High Vacuum Equip. Sys.	21
	52.220.343 L0452220343 Mandrels and Dies	650
	55.210.447 NGR34002108 N.C. State	17,003
	55.210.400 NAS1-9229 Materials Testing	28,895
	55.210.450 NAS1-9400 Spectrometer G.E.	18,990
	55.210.494 NAS1-9549 High Temp.Compons. ASTRO	2,802
	55.210.488 NAS1-9564 Heater G.E.	4,970
	NAS1-9852 Shipping	6
180-32-51-08	JET VANE INVESTIGATION RAS186	
(35-01)	60.900.050 NAS1-6935-42 LTV	32,000
	52.410.553 L4452410553 Radiographic Service	125
TOTAL FY 1969 SRT		$414,000

SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

TABLE CCXXXI - SRT (OSS) FUNDING FOR FY 1970.

		OBLIGATED
180-06-		
108-06-52-02	UPGRADING SCOUT VEHICLE RAS142, RAS180	
(06-07)	52.340.177 L-46194	$ 185
180-06-52-03	TRAJECTORY RECONSTRUCTION RAS181 (LMSC-D030985)	
(06-09)	66.000.028 NAS1-9204-3 Lockheed	2,400
180-11-		
180-11-03-01	LARGE HEAT SHIELD RAS178	
	60.400.894 NAS1-6935-24 LTV	50,000
	60.400.928 NAS1-6935-24 LTV	23,389
180-19-		
180-19-50-01	COAST CONTROL RAS176 (LTV 23.409)	
(03-05)	60.400.837 NAS1-6935-17 LTV	50,000
	60.400.899 NAS1-6935-17 LTV	7,575
180-24-		
180-24-52-02	INSTRUMENT RESPONSE RAS170 (CR1768)	
(04-03)	60.400.936 NAS1-8541-1 AVCO	50,000
	60.400.936 NAS1-8541-2 AVCO	11,200
	60.900.031 NAS1-8541-3 AVCO	1,680
180-32-		
180-32-51-02	ROCKET DESIGN RAS182	
(05-07)	60.400.867 NAS1-6935-23 (LTV 23.410)	49,071
180-32-51-03	APOLLO DELAY INITIATORS RAS158	
(07-11)	66.000.109 NAS1-5592-20 (LTV 23.489)	9,391
180-32-51-04	NONDESTRUCTIVE TEST TECHNIQUES RAS169(CR 2013)	
(07-13)	60.900.111 NAS1-8994-1 G.E.	20,000
	60.900.118 NAS1-10482 (Thiokol)	9,323
	60.900.119 NAS1-10483 (Hercules)	10,000
	60.900.120 NAS1-10484 (UTC)	10,000
	60.900.125 NAS1-8994-2 (MI) G.E.	4,468
180-32-51-05	PYROTECHNIC STUDY RUE 124	
	56.320.245 OL-65705	151
	65.120.020 NAS1-10822 (Holex) Initiator RFI Sensitivity	11,781
	65.120.126 NAS1-10988 (MB Associates) SBASI-Time Delay	60,043
180-32-51-06	IMPROVED NOZZLE MATERIAL RAS179 (LTV 23.550)	
(08-05)	60.400.876 NAS1-6935-20 LTV	35,375
	66.000.220 NAS1-10500-2-1 LTV	340

SRT (OSS) RESEARCH PROGRAMS
(180 Funds)

TABLE CCXXXI Concluded - SRT (OSS) FUNDING FOR FY 1970

180-32- Continued

			OBLIGATED
180-32-51-07	NOZZLE MATERIAL EVALUATION TGD108		
(08-06)	ADB100	L-15974 Stock Issues	$ 579
	25.410.028	NGR34002108-2 N.C. State Grant	23,773
	55.210.454	L-36622 Graphite	1
	55.120.008	L-39597 Access., Testing Machine	8
	56.130.446	L-42568 Air Filter	458
	55.210.567	L-44840-2 Maint. & Serv. X-Ray	160
	52.310.115	L-44993 Chart Paper	30
	43.400.965	L-45196 Consultant Services	190
	55.210.536	L-45542 Recorders	50
	55.210.536	L-45940 Ink	-29
	55.210.534	L-47541 Crucible	27
	52.420.406	L-47730 Ceroma Bond	51
	55.210.586	L-54395 Exhaust Filter	45
	55.210.587	L-54396 Vacuum Seal Brass	59
	52.220.331	L0652220331 Tensile Specimen	885
	55.210.504	NGR34002108 N. C. State Grant	14,953
		NAS1-8348 Common Services, Elec.P&W	745
	55.210.520	NAS1-9852 GE Meas.High-Temp.Elast. of Graphite GE	6,000
180-32-51-08	JET VANE INVESTIGATION RAS186		
(35-01)	ADB100	L-15974 Stock Issues	234
	56.130.684	L-46363	150
	56.130.723	L-46446	187
	56.130.833	L-46446-1	60
	55.210.561	L-50980 Micromanipulator	204
	55.210.565	L-52058 High Vacuum Equip. Sys.	1,474
	60.400.942	NAS1-6935-34 LTV	98,575
	60.900.050	NAS1-6935-42 LTV	42,250
	66.000.007	NAS1-6935-34-2 LTV	13,900
TOTAL FY 1970 SRT			$621,391

SRT (OSS) RESEARCH PROGRAMS
(180 FUNDS)

TABLE CCXXXII - SRT (OSS) FUNDING FOR FY 1971.

		OBLIGATED
180-06-		
180-06-50-02	ORBIT DETERMINATION RUQ106	
	June 1972 65.520.008 NAS1-11686	$ 4,653
180-06-52-03	TRAJECTORY RECONSTRUCTION RAS181 (LMSC-D030985)	
(06-09)	Oct. 1970 60.400.868 NAS1-9204 Lockheed	25,240
	Jul. 1971 NAS1-9204 Shipping	29
	Feb. 1972 60.400.931 NAS1-10000-R-21	1,385
	Feb. 1973 66.000.257 L-88205	2,422
180-17-		
180-17-50-01	UPPER STAGE CONTROL RAS187	
(01-02)	Feb. 1972 60.400.931 NAS1-10000-R-6 LTV (23.488)	47,265
180-17-50-02	GUIDANCE SYSTEM INVESTIGATION RAS198 (MCR-71-158)	
(05-05)	Jan. 1971 66.000.001 NAS1-10504 Martin Marietta	65,805
	Feb. 1972 60.400.931 NAS1-10000-R-13 LTV	4,727
	Feb. 1972 60.400.931 NAS1-10000-R LTV	3,614
180-19-		
180-19-50-02	FOURTH-STAGE STOP CAPABILITY	0
(03-06)		
180-32-		
181-32-51-01	PAYLOAD CONTAMINATION RAS199 (NASA CR112014)	
(04-02)	Jun. 1971 60.900.178 NAS1-10763 (MCF-71-158)	33,448
	Jul. 1973 60.900.178 NAS1-10763	-855
180-32-51-03	APOLLO INITIATORS AND SPIN MOTORS RAS158	
(07-11)	Feb. 1971 NAS1-10000 Shipping	1
180-32-51-04	NONDESTRUCTIVE TEST TECHNIQUES RAS169	
(07-13)	Sept. 1972 66.000.198 NAS1-10483-2 Hercules/Bacchus	5,000
	Nov. 1972 66.000.197 NAS1-10484-2 United Tech. Cen.	5,000
	Nov. 1972 66.000.199 NAS1-11859 Thiokol Chem. Corp.	5,000
180-32-51-05	PYROTECHNIC STUDY RUE 124, RAS403	
(07-14)	Feb. 1971 65.120.011 NAS1-8754-9	13,000
	Jul. 1971 65.120.026 NAS1-10988	7,307
	Feb. 1972 Surplus NAS1-10000-R, LTV	57,009
	May 1972 66.000.273 NAS1-10000-34-R-70	3,142
180-32-51-06	IMPROVED NOZZLE MATERIAL RAS 179 (LTV 23.550)	
(08-05)	Nov. 1971 60.400.876 NAS1-10500-2 LTV	26,002
	Dec. 1971 60.400.876 NAS1-10500-2 LTV	-20,564
180-32-51-07	NOZZLE MATERIAL EVALUATION TGD108	
	Jun. 1971 ADB100 L-15974 Stock Issues	168
TOTAL FY 1971 SRT		$288,798

As an example, Program 180-06-52-03 resulted in Exhibit V.

The Scout trajectory reconstruction program, SPEAR (Scout Performance Evaluation and Ascent Reconstruction) was developed for the Scout Program Office, Langley Research Center by Lockheed Missiles and Space Company. Instructions for the utilization of SPEAR are contained in two manuals.

LMSC/D030984	User's Manual - SPEAR
LMSC/D030985	Programmer's Manual - SPEAR

These were provided as fulfillment of Part V.A.2 of the NASA contract NAS1-9204.

The work was conducted under the direction of the Scout Program Office. Technical monitor for the initial period of development was Donald G. Eide. This responsibility was assumed by Joseph W. Drewry for the latter period of the contract.

The SPEAR computer program is a Scout trajectory reconstruction program for use on the NASA Langley Research Center CDC 6400/6600 computing system. The basic fitting technique employed had been developed by Lockheed Missiles and Space Company (LMSC) and existed in operational postflight programs for its in-house activities. The corresponding programming for this application required only the modifications to insure compatibility with the specifications of the Langley CDC 6400/6600 system. The contract work concerned primarily the mathematical simulation of the Scout vehicle, the derivation of the partial derivatives required in the fitting process, and the implementation of the theoretical development into a computer program operational at Langley.

Included under contract scope was the development of necessary data conditioning functions. It was early recognized that these capabilities would best be provided as auxiliary programs to avoid additional complexities in the main analysis program. Documentation of the data conditioning programs has therefore been referred to appendixes to the contract report.

Development was performed on a UNIVAC 1108 computer in the LMSC Central Computing Facility. Program design and coding stressed independence of computing machine and observed the specifications supplied by NASA for the Langley CDC 6400/6600 system. A similar, though not identical, system at a Control Data Corporation Data Center was used for final checkout prior to installation of the programs on the Langley computing system dated February 1, 1971.

The end product was a powerful tool for determining trajectories and analyzing the Scout vehicle performance. The main program has the code name SPEAR. The trajectory reconstruction is a general capability for

any vehicle for which triaxial accelerometer and body attitude rate data are available. The performance evaluation capability is restricted to vehicles with propulsion and control systems similar to those modeled for the Scout vehicle. The first of the auxiliary programs is SPFLTR (SPEAR Filter) and provides data conditioning (including wild point rejection, data replacement, data synchronization, smoothing and differentiating) for any data tape with up to 30 variables per time point. The second is TPGEN (Tape Processor and Generator), reflecting its use in processing data tapes and generating tapes in the standard format expected by SPEAR. The third is PLØT20, the output of which is input to the CalComp plotter.

Theoretical Development

The basis for computer program SPEAR is the Kalman filter. This technique as applied to the extraction of information for discrete measurements contaminated by random errors has proved very successful in the reconstruction of powered ascent trajectories and the evaluation of vehicle performance. In SPEAR, the two main problems of trajectory reconstruction and performance evaluation are solved in sequence. In phase 1 the launch trajectory is fit to the radar. The best estimate trajectory obtained from phase 1 is then input data for phase 2 in which the vehicle performance is evaluated. The Kalman technique is applied in both phases.

The following is a somewhat idealized but accurate motivation for using the Kalman filtering technique for postflight analysis.

The design of a missile usually starts with the definition of a mission, the mission being specified by injection or orbit parameters with their desired tolerances. A design team is called upon to translate these objectives into hardware design parameters and their allowed tolerances A preflight error analysis is performed to check the compatibility of the hardware design with the mission.

The manufacturing group takes the design specifications and builds the hardware. At this time the hardware parameters become statistical random variables with means and variances. Quality control is employed to insure that the statistics of these parameters are compatible with the design specifications.

The preflight knowledge at this point is not the actual hardware values but a measure of their statistics. When the vehicle is launched, telemetry is employed to monitor vehicle hardware performance and radar is employed to monitor vehicle trajectory performance.

The postflight team must ascertain whether the actual vehicle hardware and mission parameters were within tolerance. The team begins by

reconstructing the trajectory and encounters the first obstacle. It becomes clear that all the data sources are statistical random variables with means and variances (the vehicle hardware parameters by virtue of manufacturing techniques and the telemetry and radar data by virtue of communication equipment noise and other random disturbances). The data reduction personnel are called upon to supply the uncertainties of the telemetry and radar data. At this point one could say that the most likely values of the parameters would be the smoothed value obtained from the noisy data. A closer analysis would reveal that conflicts arise in this fasions. The following question would be asked - What is the "size" of the uncertainty on motor head cap pressure relative to the "size" of uncertainty on radar range azimuth and elevation? The analyst must answer these types of questions before selecting the most accurate source for a particular parameter. But even by doing this he is ignoring some information (even though less accurate) that should contribute, to a lesser extent, to the value of the parameter.

At this point the postflight group is confronted by two main questions. First, how can one compare all the data sources with their assigned uncertainties? Second, what was the most likely value of these parameters and to what accuracy, given all the data? It is within this setting that the Kalman fitting problem is posed. The first question is answered by the definition of a nodel and the second by use of Kalman's fitting equations.

Role of the model.- As hinted above, the purpose of the model is to provide a method of comparing all the data sources to be used and their respective variances. The demands on the model are that there must be fitting parameters which can be adjusted to explain the discrepancies between the various data sources except for those caused by random noise.

Portions of the program and User's Manual are shown in exhibit V.

EXHIBIT V

SCOUT TRAJECTORY RECONSTRUCTION
PROGRAM SPEAR

PROGRAMMER'S MANUAL

by W. D. Smith and J. W. Dilger
Lockheed Missiles and Space Company

SUMMARY

This manual documenting program SPEAR (Scout Performance Evaluation and Ascent Reconstruction) contains the information required by a programmer responsible for its maintenance. To satisfy the requirements of the Langley Research Center computing system, two procedures were adopted. First, the program was designed to operate in two phases. In phase 1, a best estimate of the trajectory is derived by fitting to tracking data. In phase 2, best estimate Scout vehicle model parameters are obtained by fitting to the trajectory derived in phase 1. Second, subroutines are grouped together in links on the basis of function. When one function of the computer program is completed, the subroutines of the next link overlay those currently in core and the next function is executed. This overlay process continues until all functions of the program are completed.

The link structure is presented and the differences for the two phases indicated. In addition this manual provides a description and flow diagram of each subroutine. Subroutine listings may be obtained from the program source on data cell at the Langley Research Center.

SPEAR DESIGN

For efficient use of the multi-processing capability of the Langley CDC 6600, the size of program in computer core at any time is bounded. Two procedures in designing program SPEAR were adopted to comply with this requirement. First, the program was divided into two phases, each loaded as a separate program with the appropriate routines or routine versions. Several subroutines have the same name and perform the same function in both phases, but use different equations and logic. Second, subroutines were grouped together in links on the basis of function. When one function of the computer program is completed the subroutines of the next link overlay those currently in core and the next function is executed. This overlay process continues until all functions of the program are completed.

Phase 1. - In the first phase, the objective is to obtain a best estimate of the trajectory actually flown by the vehicle. The approach taken in SPEAR is to input the triaxial accelerometer and body rate data from telemetry, and adjust the state vector (consisting of the parameters of the assumed error model) by fitting the computed trajectory to tracking data in a least squares sense. The output of phase 1 consists of tapes of the histories of the vehicle's radius, velocity and attitude and, in addition, of the body linear and angular accelerations for use in phase 2. For details, reference should be made to the SPEAR User's Manual, LMSC/D030984.

Phase 2. - This phase also is described in detail in the SPEAR User's Manual, LMSC/D030984. Here the input consists of tapes output from the phase 1 analysis along with appropriate model tapes from telemetry. The phase 2 state vector is then adjusted by fitting to the observations in the least squares sense. The outputs of this phase are best estimate atmospheric, aerodynamic and propulsion model parameters.

Link Structure. - The structure for either phase consists of a main link (0) and four overlay sublinks (1-4). The general function of each link is as follows:

Link	
0	Main program which stays in core. Establishes common allocations and sets sequence of remaining link executions.
1	Sets constants
2	Initializes program
3	Calculates model and fitting corrections
4	Performs on-line plotting

The list of subroutines in each link is given below. Note that subroutines within each link may not be used in both phases. Also a subroutine with the same name and performing the same function in both phases, may compute different equations.

Link 0

	Phase 1	Phase 2	
SPEAR	X	X	D
BUFS1Z	X	X	S
CHECK	X	X	D
DIFRNC	X	X	S
DØT	X	X	S
DTRIG	X	X	S
ENDTAP	X	X	S
FMAG	X	X	S
GETPUT	X	X	S
GØØF	X	X	S
INPR	X	X	S
INSERT	X	X	S
INTRM	X	X	S
INVN	X		
IUFLAG	X	X	S
LØCD	X	X	S
LØGTAP	X	X	S
MØVER	X	X	S
ØUTP	X	X	S
PAGE	X	X	S
REJECT	X	X	S
REWND	X	X	S
SDØT	X	X	S
SHIFT	X	X	S
SITE	X		
SØRL	X	X	S
TIMØUT	X	X	S
TRDATA	X	X	S
XINV	X	X	S

D - Different versions
S - Same versions

Link 0 Cont'd

	Phase 1	Phase 2		
XL0C	X	X	S	
XMAT	X	X	S	
XP	X	X	S	
ISHIFT	X	X	S	COMPASS CODED

Link 1

CONST	X	X	D
MC0NS	X	X	D

Link 2

MAIN1	X	X	D
C0PZ	X	X	S
IGET	X	X	S
INPT	X	X	S
ISHFTL	X	X	S
LSTRP	X	X	S
NIPS	X	X	S
PAD	X		
PR0C	X	X	S
SEQUEN	X	X	S
SETD	X	X	S
SETUP	X	X	D
SPHERI	X	X	S
START	X		
TABLE		X	
TRK2EQ	X	X	S

Link 3

MAIN2	X	X	D
ADAMS	X	X	S
AER0		X	
ANSERS	X		D
ARKTAN		X	
ATM0S		X	
BACKUP	X		
B0DY		X	
CNTRLS		X	
C0MBIN	X	X	S
C0RE	X	X	S
DAMP		X	
DERI	X		
DERI2		X	
DISC0N	X	X	S

Link 3 (Cont'd)

	Phase 1	Phase 2	
DTLU		X	
FPS16	X		
GRAVTY	X		
HEART	X	X	D
HISTRY	X	X	D
HMATRX	X	X	D
HPHT	X	X	S
INP		X	
INPA	X		
INPW	X		
KALMAN	X	X	D
KICK	X		
L0ADIB	X	X	D
MERGE	X	X	S
M0DEL	X		
M0T0R		X	
MSTRMP	X		
0UPR	X	X	S
0UTPHI	X	X	D
0UTPUT	X	X	D
PARTE	X		
PARTG	X		
PCERR	X	X	D
PL0TAP	X	X	D
PSTART	X	X	S
QFR0MT	X		
QSTART	X		
QTRAN	X	X	S
QTWIST	X	X	S
RADART	X	X	D
REFER	X		
RELIN	X	X	D
SAINT	X	X	S
SETRIG	X	X	S
SPHRCL	X		
STAT	X	X	D
SYMVRT	X	X	S
TFR0MQ	X		
THRUST		X	
TNEXT	X	X	S
UPDAT	X		
URNDM	X	X	S
XBT	X	X	S

Link 4

MAIN3	X	X	S
PL0T	X	X	S
PT1401	X	X	D

SUBROUTINE DESCRIPTIONS

In this section of the manual, the function of each SPEAR subroutine is described. Arrangement of the subroutines is by link, then alphabetically after the main subprogram for each link.

Link 0

SPEAR - Phase 1 and 2.

Main program which stays in core and controls the four sub-overlay programs. SPEAR also sets the lengths of commons and initializes them to zero. The following four sub-overlays are called in order: sub-overlay one (C0NST) initializes input commons to their nominal values (performed only once per job submittal); sub-overlay two (MAIN1) reads the card input and sets initial conditions for the integration sub-overlay three (MAIN2); sub-overlay three (MAIN2) performs the trajectory integration, fitting, and printout; sub-overlay four (MAIN3) controls the on-line printed plots; and finally subroutine CHECK is called to perform a partials check when specified. For subsequent cases the above sequence is repeated starting with sub-overlay two (MAIN1) until a system end-of-file is encountered by the input package.

ARKTAN (SINE, COSINE) - Phase 2 only.

Subroutine to compute the arctangent in radians for angles in the range plus or minus 2π.

ANGLE = ARKTANGENT (SINE/COSINE)

BUFSIZ (ND) - Phase 1 and 2.

Utility subroutine to divide the input-output tape buffer area (BUFERS COMMON) among the tape units. The buffer area is divided logically into two parts, a read buffer portion where 400 points are set aside for one record to be read or output, and an ordered buffer portion where the data are re-arranged into time-variable list, time-variable list, ... sequence. ND is a control flag to set aside buffer area for on-line plots when its value is 0 or 1.

CHECK (J) - Phase 1 and 2.

Subroutine CHECK compares the analytical partials with those obtained by perturbing the fitting parameters. J is a first pass control flag.

J = 0 to store the nominal partials, and initial and final state.
= 1 for perturbed trajectory cases.

DIFRNC (AA, BB, N) - Phase 1 and 2.

Utility function to test for equality between AA and BB within the number of bits N in the lower significant places. If equality is within this tolerance then DIFRNC is set to zero, otherwise to AA minus BB .

DØT (A, B) - Phase 1 and 2.

Utility function to calculate the vector dot product DØT of the vectors A and B .

DTRIG (T) - Phase 1 and 2.

Utility subroutine for entering and releasing the discontinuity trigger (TRIG(2) of TSTOPS COMMON). This routine also saves the list of discontinuity triggers entered and may on command re-insert the saved trigger list. DTRIG can also be called to modify the saved list from card input. T is the trigger time to be inserted. If T is equal to 1.0×10^{30} then the discontinuity trigger is released. GØØF is called when the trigger list exceeds 50 values.

ENDTAP (L, IT) - Phase 1 and 2.

Utility subroutine to put a program recognized end-of-file FND and a systems end-of-file on tapes generated by the SPEAR program. REWND is called to rewind the tape. L is the buffer index number associated with that tape and IT is the tape unit number.

FMAG (A) - Phase 1 and 2.

Utility function to calculate the vector magnitude of the vector A .

GETPUT (LABL, N, M, WRD, NN, MM) - Phase 1 and 2.

Utility subroutine to get a specified number of bits from one data word LABL and put them into another word WRD . The N - M + 1 bits are obtained from bit positions N through M of word X . The contents of X are not changed. These bits are placed into bit positions NN through MM of word WRD .

GOOF (N,A) - Phase 1 and 2.

Utility subroutine called when the SPEAR program detects an error. The routine prints out an error message (contained in the array A using N words), and terminates execution by ENDFILE 99 which allows a core dump with the proper control card.

INPR (L, IT, NTR, T1, T2, JFD, R) - Phase 1 and 2.

Subroutine used to transfer data from the tape ordered buffer area (see BUFSIZ to clarify terminology) into an array specified by the calling program. Initially, or when the data in the ordered buffer area have been exhausted, TRDATA reads one record of data into the read buffer portion. The data are then rearranged into the ordered buffer area. The tape is read until the ordered buffer area is filled.

L = the assigned buffer number

IT = the assigned tape unit number

NTR = the desired tape identification (ID) word (set to zero after correct ID record on the tape is found).

T1, T2 = lower and upper time bounds respectively of the data to be read from tape.

JFD = frequency of the data time points to be used from the data on tape.

R = array in which one time point (first point greater than or equal to (T1) and associated variable list is returned.

INSERT (WØRD, ICHAR, XLABL) - Phase 1 and 2.

Utility subroutine to insert the first character (6 bits) from XLABL into character number ICHAR of WØRD .

INTRM (X, Y) - Phase 1 and 2.

Function to initialize the random number generator. X and Y are dummy arguments. This routine uses the CDC systems RANF routine.

INVN (A, NN, DETERM, INDEX) - Phase 1 and 2.

Utility subroutine to calculate the inverse of a square matrix A and its determinant DETERM . NN is the dimension of the matrix and INDEX is a working array. The inverse is returned in the first argument. During the processing of the algorithm, rows and columns of the input matrix are rearranged to place the largest terms in the top left portion of the matrix to maintain inversion accuracy. The inverse is then re-ordered to correspond to the original input.

IUFLAG (X) - Phase 1 and 2.

Utility function to determine the machine type on which the program is being executed. The type is determined by comparing the answer obtained from subtracting a Hollerith blank from a Hollerith integer one. The value of the function is the machine number (3 for CDC computers). A message is printed out and program execution terminated when the machine is not recognized. X is a dummy argument.

LØCD (A, B) - Phase 1 and 2.

Utility function whose value is the core location of A minus the core location of B .

LØGTAP (NT, INDEX) - Phase 1 and 2.

Function to correlate logical tape unit designation with systems unit designation. Returns a blank since the two designations are the same.

MØVER (A, I, B, J, N) - Phase 1 and 2.

Utility subroutine which moves N words of A (A is unaltered) in increments of I into B in increment of J .

ØUTP (P, NRF, TIME) - Phase 1 and 2.

Subroutine to printout the lower left triangular portion of the state error covariance matrix P . NRF is the length of the initial state. TIME is the trajectory time at which the P matrix is valid.

PAGE (NDI, L, NDS) - Phase 1 and 2.

Subroutine which controls page skipping and prints out the heading at the top of each page. PAGE is called before each printout with the number of lines L to be printed. If this printing will cause the number of lines per page to be exceeded then the program skips to a new page before printing. The above action is taken when the control flag "NDI" is greater than zero. When the flag is less than or equal to zero, a page is always skipped. NDS is an indicator equal to one if a page was skipped, otherwise set to zero.

REJECT (T, I, LP) - Phase 1 and 2.

Function to reject from the fitting process time intervals of observation data on tapes. The value of the function is -1.0 to reject the observation being processed, otherwise set to +1.0. T is the current time of the observation being processed. I is the observation number. LP is the tracker number being processed. The array REJ(I,J) contains the rejection data as follows:

REJ(1,J) = tape identification label
REJ(2,J) = observation number on the tape to be rejected
REJ(3,J) = minimum time to reject data
REJ(4,J) = maximum time to reject data

REWND (L,IT) - Phase 1 and 2.

Utility subroutine to rewind tape unit IT and initialize the last independent variable of its buffer read portion (buffer number L) to 1. x 10^{31}.

SDOT (A, B, N, M, L) - Phase 1 and 2.

The value of the function is the generalized vector dot product of two vectors with L components. The first vector is obtained from the array A in increments of N , and the second vector from array B in increments of M .

SHIFT (I,T) - Phase 1 and 2.

Function whose value is the left logical shift of the contents of I moved J bits. Bits shifted out of the left are lost, and zeroes fill in from the right.

SITE (XLAT, XLOW, ALT, AZ, TS2E, RS, A, B, N) - Phase 1 only.

Subroutine to calculate the position vector of the tracker RS in inertial coordinates and the tracker-to-inertial transformation TS2E . XLAT is the tracker latitude (N=0 for geodetic, N=1 for geocentric).

TRDATA (L, IT, N) - Phase 1 and 2.

Subroutine to read one record of data from tape unit IT into read buffer L . See BUFSIZ for clarification of terminology. N is the desired identification on the first read and set to zero thereafter. The program will skip data records on the tape until the data with the correct identification is found. If correct identification is not found the program will error off by attempting to read an end-of-file, or reach the end of tape which even occurs first. The program also errors of by GOOF when data format errors are encountered in the data identification record.

XINV (ARG) - Phase 1 and 2.

The value of the function is 1/ARG if ARG is not zero, otherwise the value is zero.

XLOC (A) - Phase 1 and 2.

The value of the function is the core location of A .

Link 0 - Cont'd

XMAT (A, B, C, NXA, NRB, NCB, NAT, NBT, NST) - Phase 1 and 2.

General matrix multiply subroutine with A and B as input matrices and C as the resultant matrix. The following options are available:

NXA = number of rows of A if NAT = 0.
= number of columns of A if NAT = 1.

NRB = number of rows of B .

NCB = number of columns of B .

NAT = 0, use matrix A as is.
1, use matrix A transpose.

NBT = 0, use matrix B as is.
1, use matrix B transpose.

NST = 0, initialize matrix C to zero.
= 1, leave C as defined on input.

$$\begin{bmatrix} C \end{bmatrix} = \begin{bmatrix} C \end{bmatrix} + \begin{bmatrix} A \end{bmatrix} \begin{bmatrix} B \end{bmatrix}$$

XP (A, B, C) - Phase 1 and 2.

Subroutine which calculates the vector cross product,

$$C = AXB$$

Link 1

CØNST - Phase 1 and 2.

Main program of the first sub-overlay. Initializes model-independent data (output headings, earth constants, pad location, etc.) and nominal control values. This sub-overlay is called only once per job submittal. Subroutine MCONS initializes the model dependent data.

MCØNS - Phase 1 and 2.

Subroutine to initialize model dependent data (parameter output headings, plot labels, etc.) including nominal model control flags.

Link 2

MAIN1 - Phase 1 and 2.

Main program of the sub-overlay which reads card input and calculates initial conditions for the integration sub-overlay. Subroutine INPT reads the card input. If a card input error is detected in one case, all other case data is checked for errors before termination of the run. PROC is called to process input control data for the observation tapes (stacking and rewinding of tapes). SETUP initializes the constants and the working state common. START is called when the radar self start option is requested (phase 1 only).

CØPZ (L, ITA, NTR, ITB, NEWID) - Phase 1 and 2.

Subroutine to copy the data from one tape to another. L is the buffer number where the data transfer is taking place. ITA is the input tape unit. NTR is the identification of the data on the input tape. ITB is the output tape unit, and NEWID is the identification of the data on the output tape. The call to GØØF is redundant to the one in TRDATA. TRDATA reads the input tape.

IGET (IA, N, M) - Phase 1 and 2.

Function to right-adjust a word a specified number of bits. The N - M + 1 bits are obtained from bit positions N through M of the word IA (IA is not changed) and placed right-adjusted (bits N-M through 0) into the value of the function. The remainder of the word is filled with zeroes.

INPT (T, IER) - Phase 1 and 2.

Subroutine which reads the card input in a free field format and stores the data into the proper data blocks. A card is read one at a time and NIPS is called to decipher the data on each card. If an error is detected, IER is returned as a negative quantity. The program continues to process the remaining cards for possible additional errors before terminating execution. The deciphered data are output into the array T (this array spans all the input commons starting with cell 1 of the A block). Each input card is written out in the same format as read. The systems STØP routine is called when an end-of-file is encountered.

Link 2 - Cont'd

ISHFTL (I, J) - Phase 1 and 2.

Function to left logical shift a word. The value of the function is the contents of the word I shifted J places. Bits shifted out of the left are lost, and zeroes fill in from the right.

LSTRP (IX, IY) - Phase 1 and 2.

Function to decode the first character IX of the word IY and transform it into an operation code (function value) for subroutine NIPS. IY is replaced with IY shifted 6 bits (one character) to the left.

NIPS (A, NK, X, I) - Phase 1 and 2.

This subroutine interprets the BCD card input array A, (Columns 2-6 for card address, and Columns 7-80 for data). NK is the number of characters (5 for card address, 72 for card data) to be interpreted. X is the decoded output array. I is the index of the first data word on the card relative to the X array. LSTRP transforms each character of the A array into NIPS operation code.

PAD - Phase 1 only.

Subroutine to calculate initial position and velocity for a pad start up.

PRØC - Phase 1 and 2.

Subroutine to process all observation tape definition lists. REWND is called to rewind all observation tapes and initialize their buffers. CØPZ is called to break up a single stacked tape with multiple time-overlapping observation data to be fitted simultaneously, into separate tapes. ENDTAP is called to end-file the generated tapes.

SEQUEN - Phase 1 and 2.

Subroutine which controls the entering of the input discontinuity trigger list and its printout. SETD eliminates duplicate triggers as defined by DIFRNC. DTRIG inserts the input array into the discontinuity working array.

Link 2 - Cont'd

SETD (N, S, I, T) - Phase 1 and 2.

Subroutine to build the trigger times and identification index array S from the input trigger number I and value T. N is the corresponding index in the S array. GØØF is called when the number of stored triggers exceeds 100.

SETUP - Phase 1 and 2.

Subroutine to initialize the Adams integrator constants and working state common. SØRL is called to initialize the initial state error covariance matrix. In phase 1 only, PAD is called for a pad start up and SPHERI is called for a spherical start up. REWND is called to rewind all model input tapes and initialize their buffers. SEQUEN is called to set up the input discontinuity trigger list. BUFSIZ is called to allocate tape buffer storage. In phase 2 only, TABLE is called to allocate table look up common among input tables and model input tapes.

SPHERI - Phase 1 only.

Subroutine to transform input position and velocity from spherical to cartesian coordinates.

START - Phase 1 only.

Subroutine to control the calculation of initial position and velocity by fitting a parabola to 11 radar observation points. GØØF is called when the radar is doppler. From the 11 mid-point fit of radar observation data the time derivatives of the observations at the mid-point are obtained. TRK2EQ is called to transform the mid-point observations and corresponding derivatives into equivalent position and velocity in cartesian coordinates. ØUTP is called to printout the initial state error covariance matrix.

TRK2EQ - Phase 1 only.

Subroutine to transform a radar observation and its time derivatives into cartesian position and velocity depending on the type of radar.

Link 2 - Cont'd

TABLE - Phase 2 only.

Subroutine to allocate storage in the table array TABL among all the tables to be interpolated. The input table array TABL is scanned to determine the amount of storage used by input tables. The first 10 tables are reserved for single independent variables. Next, tables 16 through 40 are reserved for double independent variables. The remaining storage is divided among the model input tapes being used (tables 11 through 15). GØØF is called when attempting to input into a model tape table (tables 11 through 15). GØØF is also called when the table array TABL is too small.

Link 3

MAIN2 - Phase 1 and 2.

Main program of the integration sub-overlay. The input control block A is interrogated to determine the type of run (fitting, combine, output residuals, integration, and store state). SØRL transfers the error covariance matrix. LØADIB initializes the integrator with initial conditions calculated in Link 2. HEART integrates the trajectory from initial to final time. PCERR computes the percent error between predicted and actual final state values. ØUTPHI prints out the state transition matrix. UPDATE computes the growth of the state error covariance matrix from initial to current time. CØMBIN adds the injection parameter observation to the fitting process. ANSERS prints out the state corrections and the convergence sums information.

ADAMS - Phase 1 and 2.

This subroutine is a fourth order ADAMS-MOULTON integrator with error control on the step size. Error is controlled by monitoring the last term of the formula. When it exceeds the upper error bound for any parameter being integrated, the step size is halved. When it is less than the lower error bound for all variables being integrated then the step size is doubled.

Link 3 - Cont'd

AERØ (XM, C, COEF, C2M, C2P) - Phase 2 only.

Subroutine to calculate aerodynamic error model coefficients and their partials. XM is the array of critical Mach numbers C is the array of four fitting parameters. COEF is the value of the coefficient. C2M is the partial of the coefficient with respect to Mach number. C2P is the partial with respect to the four fitting parameters.

ANSERS (NP, NL, CAYX, CAYC, NEXIT)

Subroutine to printout the state correction and convergence sums for a fitting pass. ØUTPUT is called to printout the final state before and after predicted state change corrections from fitting. RELIN is called to update the final predicted state from corrections. NP is the iteration number. NL is the number of state updates per iteration (limited to one). CAYX is the convergence criterion on initial position and velocity (phase 1 only). CAYC is the convergence criterion in the entire initial state. NEXIT is the convergence indicator equal to 1 not converged, equal to 2 converged.

BACKUP - Phase 1 only.

Subroutine to force ADAMS to integrate from the radar mid-point fit to the initial time for a radar self-start.

ATMØS - Phase 2 only.

Subroutine to compute the atmospheric dependent quantities (pressure, density, temperature, wind velocity and azimuth, Mach number, dynamic pressure and angles of attack) and their corresponding partials. SAINT performs the table look ups and QTWIST and QTRAN obtain the coordinate transformations.

BØDY - Phase 2 only.

Subroutine to compute the body aerodynamic forces, moments and their corresponding partials. AERØ computes the error term coefficients. SAINT performs single table lookups and DTLU performs double table lookups for preflight aerodynamic coefficients.

CNTRLS - Phase 2 only.

Subroutine to compute the fins and jet vanes forces, moments, and their corresponding partials. SAINT performs table look up on jet vane force coefficients and DTLU performs table look up on fin force coefficients. INP fills the TABL array with data from the fins displacement tape for SAINT table look up.

COMBIN - Phase 1 only.

Subroutine to add the injection parameter observation to the existing observation list. In case of an optimization run it is the only observation. UPDATE is called to update the state error covariance matrix and SPHRCL computes the injection observations and their partials. SORL is used to load the observation and its variances.

C0RE (A, NRA, B, NRB, NRT, NCT) - Phase 1 and 2.

Subroutine to transfer data from matrix A dimensioned NRA x NCT to matrix B dimensioned NRB x NCT .

DAMP - Phase 2 only.

Subroutine to compute the jet damping forces, moments, and their partials.

DERI - Phase 1 only.

Subroutine to control computation of model derivatives and partial derivatives to be integrated. GRAVTY computes the gravitational acceleration. MODEL computes the body acceleration. PARTG computes the gravity partials and PARTE computes the power model partials. DERI is called at each integration cycle.

DERI2 - Phase 2 only.

Subroutine to control computation of model derivatives and partial derivatives to be integrated. ATM0S computes atmospheric quantities, MOTOR computes engine thrust, and B0DY, CNTRLS, DAMP and THRUST computes the various force and moment vectors.

DISC0N (T) - Phase 1 and 2.

Function which returns a value indicating the relation of current time to the trigger value T. Function value is -1 for time less than T, 0 for time equal to T and trigger not released, and +1 for time greater than or equal to T and the trigger released.

DTLU (I, XM, XT, TBLP, NTBLS) - Phase 2 only.

Subroutine to call SAINT to perform a double table look up. I is the dependent variable number. XM and XT are the first and second independent variable values to interrogate the table respectively. TBLP is the 2-vector for the partial of the dependent variable with respect to independent variables. NTBLS is a coded number giving the starting and ending table numbers defining the double table.

FPS16 (N0PT) - Phase 1 only.

Subroutine to calculate FPS16 (at equivalent) radar measurements and partials with respect to the state. N0PT is the partial control flag, equal to 1 to compute partials, equal to 0 to delete partials.

GRAVTY (X, G, 0BLA, XMU) - phase 1 only.

Subroutine to compute oblate earth gravity. X is the inertial position vector, G is the gravity vector, OBLA is the earth's equatorial radius, and XMU is the earth's basic gravity constant.

HEART (TE, ND, PT, DPT) - Phase 1 and 2.

Subroutine to control the integration from initial to final time. Control is returned to HEART at each integration step to find next trigger interrupt and to call appropriate routines at an interrupt. KK computed by TNEXT determines the next trigger number up and its value. DISCON determines when the trigger is hit. DTRIG releases discontinuity trigger (type 2) after it is processed. SETRIG introduces the next trigger for that routine after its previous one has been processed. ADAMS integrates to the next time point, DERI computes derivatives and partials, HISTRY controls generation of output tapes, and MERGE is called to select multiple observations and perform fitting.

HEART - Cont'd

RELIN is called when the accumulated state changes (convergence sums) exceed control values. When the value is exceeded the state is updated at that point instead of waiting till the end. TE is the final time. ND is the type of run control flag (=0 fitting pass, =1 output residuals, =2 combine, =3 integrate). PT is the base time of output frequency DPT .

HISTRY (TR4) - Phase 1 and 2.

Subroutine to control the writing of the history tapes required for phase 2 or plotting. Calculations are performed to transfer state variables to the desired output quantities. 0UTPR generates the tapes in standard format. TR4 is the HISTRY trigger time.

HMATRX (N0PT) - Phase 1 and 2.

Computes the best estimate of the current state based on all prior fitting up to current time. Computes partials of calculated observations with respect to fitting parameters by product of H matrix and Φ matrix. FPS16 or MSTRMP computes the appropriate calculated observations and corresponding H matrix.

HPHT (A, B, C, N, M, KK) - Phase 1 and 2.

Subroutine to obtain the following matrix product.

$$[C] = [A]\,[B]\,[A]^T$$

Dimensions of A are NXN , of B are MXM , and of C are NXN .

INP (N,IX) - Phase 2 only.

Subroutine to transfer data from the ordered tape buffer to the TABL array for table look ups. INPR is called when the tape buffer array has been exhausted. N is a first pass flag (≠0 on first pass, =0 thereafter). IX is the list number to define type of data (fin displacement, position and velocity, etc.) to be read on what tape, buffer, and time bounds. REWND is called to rewind the tape and initialize the buffer.

INPA (N) - Phase 1 only.

Subroutine to read acceleration data tape. See description of INP.

INPW (N) - Phase 1 only.

Subroutine to read rates data tape. See description of INP.

KALMAN - Phase 1 and 2.

Subroutine to calculate the initial state corrections from observations using the KALMAN technique. This routine is called at each observation point. PL0TAP generates output tapes for plots on parameter correction history. PSTART is called when the collective versus KALMAN recursive fit is used.

KICK (ND) - Phase 1 only.

Subroutine to initialize vehicle attitude parameters and model data. INPA and INPW are called for the initial read of the acceleration and rates data tapes. ND is the type of run control flag (=0 on fitting pass, =1 output residuals, =2 combine, =3 integrate).

L0ADIB (ND) - Phase 1 and 2.

Subroutine to initialize the state transition matrix (Φ) and the working state common with the values computed in Link 3. DTRIG is called to insert the commanded rate time triggers. BUFSIZ allocates the minimum tape buffer area. KICK (phase 1 only) initializes attitude and model data. ND is the type of run control flag (=0 fitting pass, =1 output residuals, =2 combine, and =3 integrate).

MERGE (ND, L, TRL) - Phase 1 and 2.

Subroutine to select tape observation data from multiple sources in order of increasing time. INPR reads the data from tapes, STAT computes the fitting residuals, and RADART will generate noisy observation tape. G00F is called when one of the following faults is detected: more than 10 simultaneous tape observation sources defined, machine computation error shown by present

MERGE - Cont'd

time greater than next observation time, and time greater than upper bound on observation tape. ND is the type of run control flag (=0 fitting pass, =1 output residuals, =2 combine, and =3 integrate). L is the tape buffer number and TRL is the observation trigger time.

MØDEL (IARG) - Phase 1 only.

Subroutine to compute body acceleration and attitude derivatives. QSTART computes initial attitude for a pad start or from input roll, pitch, and yaw. IARG is control flag (=0 when MODEL is called from RELIN to update predicted state, and =1 when called from DERI).

MØTØR - Phase 2 only.

Subroutine to compute magnitude of engine thrust, flow rate and their partials. SAINT performs table look up for head cap pressure, thrust, and flow rate tables. INP reads the head cap pressure tape.

MSTRMP (NØPT) - Phase 1 only.

Subroutine to calculate doppler radar observations and partials. NOPT is partial control flag (=1 compute partials, and =0 delete partials).

ØUPR (L, IT, NTR, T1, T2, N R) - Phase 1 and 2.

Subroutine to output data files on tape in standard format. Inserts one data time point R at a time into the tape write buffer L, and when buffer is filled data is written on tape. IT is the tape unit number. NTR is the identification word on tape for the first call and zero thereafter. T1 and T2 are time bounds on the data to be written. N is the number of dependent plus independent variables.

ØUTPHI - Phase 1 and 2.

Subroutine to printout the state transition matrix.

ØUTPUT - Phase 1 and 2.

Subroutine to printout in block format the trajectory and model parameter histories. The current state vector is converted to the desired output quantities.

PARTE - Phase 1 only.

Subroutine to calculate partials of body acceleration and attitude with respect to model fitting parameters.

PARTG - Phase 1 only.

Subroutine to compute the partial of the gravity vector with respect to the position vector.

PCERR (N) - Phase 1 and 2.

Subroutine to calculate the percent error between the predicted and actual final state vector. N is a control flag (<0 store nominal final state, =0 store predicted final state, and >0 calculate percent error).

PLØTAP (KTYPE) - Phase 1 and 2.

Subroutines to generate tapes for plots of the fitting parameter histories (KTYPE =0) and observation residual histories (KTYPE =1). This subroutine also computes forward, right, down, right angle, and up angle residuals (phase 1 only).

PSTART - Phase 1 and 2.

Subroutine to perform collective versus KALMAN recursive fitting.

QFRØMT (Q,T) - Phase 1 only.

Utility subroutine to calculate the equivalent four-vector Q from the transformation matrix T .

QSTART - Phase 1 only.

Subroutine to calculate initial body attitude for a pad start or input roll, pitch, and yaw.

QTRAN (Q,TB2I) - Phase 1 and 2.

Utility subroutine to calculate the equivalent transformation matrix TB2I from the four-vector Q .

QTWIST (IAXES, ANGLE, QI, K) - Phase 1 and 2.

Utility subroutine to add four-vector rotations about coordinate axes IAXES through angle ANGLE . QI is the resultant single four-vector rotation and K is a control flag (=0 to initialize the four-vector and =1 sum of four-vectors). G00F is called when IAXES is zero.

RADART (L, NTR, T1) - Phase 1 and 2.

Subroutine to generate a simulated noisy observation tape. L is the tape buffer number, NTR is the data tape identification word on first call and zero thereafter. T1 is the time of the next observation.

REFER (R, V, Q) - Phase 1 only.

Subroutine to obtain the orbital coordinate system four-vector Q from the inertial system as defined by the position and velocity vectors, R and V.

RELIN - Phase 1 and 2.

Subroutine to apply the correction to the current state accumulated from prior fitting.

SAINT (SX, SY, N, X, II, C, ND, T) - Phase 1 and 2.

Subroutine to perform single independent variable table lookups. The order of lookup may be constant, linear, or parabolic. G00F is called when one of the following is detected: independent variable array SX is not in increasing order, table not defined on input, table starts with a double point, and not a sufficient number of data points separating double points. SY is the dependent variable array. N is the number of dependent plus independent variables per point. X is the value of the independent variable to interrogate the table. II is the index in the table last interrogated. C is the set of coefficients in the table fitted curve. ND is the order

SAINT - Cont'd
of fit (=0 constant, =1 linear, and =2 parabolic). T is the next double point value of the independent variable.

SETRIG (K, T) - Phase 1 and 2.

Subroutine to insert triggers and find next trigger up. TNEXT is called to find the next trigger. T is the trigger value to be inserted and K is the trigger number type.

SPHRCL (H) - Phase 1 only.

Subroutine to transform position and velocity to spherical coordinates and compute the partial H of the latter with respect to the first.

STAT - Phase 1 and 2.

Subroutine to calculate and printout the residual statistics (mean, variance about the solution trajectory, and variance about the mean). PLØTAP generates the residual tape for plotting. HMATRX computes the residuals.

SYMVRT (A, N) - Phase 1 and 2.

A utility subroutine to invent a symmetric matrix A of dimension N x N. The inverse is returned in A .

THRUST - Phase 2 only.

Subroutine to compute body thrust and moment vectors and their partials. Provision is provided to read a tape for the reaction control thrust history using subroutine INP.

TFRØMQ (T,Q) - Phase 1 only.

A utility subroutine to calculate the equivalent transformation matrix T from the four vector Q .

TNEXT - Phase 1 and 2.

Subroutine to find the next trigger time for the integrator.

UPDAT (NDØ, NDV, P, NRF, NCF, PHI) - Phase 1 and 2.

Subroutine to update the state covariance matrix P by the growth in the state transformation matrix PHI from initial time to current time. Dimensions of PHI are NRF x NCF and of P are NRF x NRF . NDØ is the P matrix output control flag and NDU is the update control flag. The formula for the update is

$$P = \left[\text{PHI} \right] P \left[\text{PHI} \right]^T$$

URNDM (X) - Phase 1 and 2.

The value of the function is a random number. X is a dummy argument.

XBT (A, B, C, NDB, NDT) - Phase 1 and 2.

Utility subroutine to calculate the quaternion product C of four-vectors A and B . NDB is a control flag (=0 and >0 for the two types of quaternion products). NDT is a control flag (=0 non transpose, and >0 transpose quaternion matrix).

Link 4

MAIN3 - Phase 1 and 2.

Main program of the fourth sub-overlay to control the processing of on-line plots. PT1401 is called to execute the plots.

PLØT (NQ, NLINES, SCALE, IDSH, SD, T1, TL, STEP, ID) - Phase 1 and 2.

Subroutine which prints out the on-line plots. NQ is the number of plots to be printed. NLINES is the number of data points per plot. SCALE is the number of dependent variable line grids. IDSH is the number of lines per cycle for multiple iteration plots. SD is the data array to be plotted. T1 and TL are the time bounds of the data to be plotted. ID is the array for the plot label heading.

PT1401 (NTYPE) - Phase 1 and 2.

Subroutine to pre-process the data to be plotted. The tape histories generated by PLØTAP are read and the data averaged to fit on one page. NTYPE is a control flag (=0 for fitting parameter plots, and =1 for residual plots).

Appendix A

PROGRAM SPFLTR

Program SPFLTR is designed to perform data conditioning prior to their use in the analysis program SPEAR. The input to SPFLTR will be a telemetry tape from ADTRAN, converted to engineering units and unblocked. If necessary, the COPYR command in TPGEN is used to unblock the data. The basic functions which have been provided in SPFLTR are eliminating or replacing bad data, synchronizing, smoothing and differentiating. In addition, a factor and bias(nominally unity and zero) are applied to all values output by the program. Program control and conditioning information are supplied by an ordered sequence of card input which is described fully in the SPEAR User's Manual, LMSC D030984. The data output tape from SPFLTR may be written in standard format compatible with SPEAR, or in non-standard format requiring additional manipulation for input to SPEAR.

Appendix B

PROGRAM TPGEN

Program TPGEN is primarily a tape manipulation program in which instructions are supplied by a series of command cards. TPGEN will read an input tape of any format which, if not known, may be determined using the COPYR command to dump the tape. The desired manipulation may then usually be defined by the command cards. The corresponding subroutines provide capability to meet a wide variety of requirements. These include selecting specific parameters from a list, applying factors and biases, tape rewinding between operations, skipping files and records, unblocking a blocked tape, and writing an output tape in a standard format for input to SPEAR, with the variables reordered as required. For details of the use of TPGEN, reference should be made to the SPEAR User's Manual, LMSC/D030984.

OPERATION OF SPEAR

The maximum use of program SPEAR will be effected with a basic understanding of the problem for which the program was designed. As background we note that the Scout vehicle configuration has been defined well in advance of launch. From a variety of sources the expected performance of each system has been predicted. In some cases the preflight nominal characteristics are derived from ground tests, alternatively from theoretical considerations or from an evaluation of previous flights. These data are input to a preflight analysis computer program which provides a pitch rate profile for the specified mission and ensures that none of the constraints (structural, thermal, etc.) has been violated. The extent to which the accuracy of the prediction is attempted is demonstrated in the handling of the effect of the winds to be experienced. In the earliest trajectory simulations and the design of the programmed pitch rates, winds are assumed zero. During the immediate prelaunch i.e., countdown phase, wind vs. altitude determinations are made. A compensating bias is then computed and applied to the launch azimuth setting. This correction may be updated several times up to within a very short time before launch.

Despite precautions such as these the vehicle will deviate fro the planned nominal trajectory. The actual trajectory will be the result of the combination of (in general) small variations from nominal in each system, the variations being due to incomplete knowledge or control of the individual systems. For example the extreme complexity of the actual ascent conditions precludes a precise duplication in ground tests and introduces uncertainties in measured aerodynamic and propulsion parameters in addition to those from instrumentation errors. Other deviations occur because of approximations in the earth and atmosphere models and because of changes occurring between the times of the latest atmospheric soundings and the Scout ascent. The accuracy of preflight predictions is clearly a function of how accurately the systems are known. It is therefore important that all available evidence be used in determining the parameter values to be used in predicting flight performance. Where two or more independent methods are available to determine a parameter, a means is provided for improving confidence in the predicted values. In this context

the merit of employing post flight analysis of actual flight data to check preflight predictions is manifest. It is to this end that program SPEAR has been designed.

Post flight analysis of an actual Scout launch uses available telemetered data and the radar and/or Doppler tracking measurements. Program SPEAR is not intended to replace current analysis effort but will provide a powerful tool to assist the engineer in evaluating the data. It will be assumed here that these have been preprocessed, that the telemetry data have been time correlated, digitized, transformed to engineering units, and smoothed, that the tracking data have been corrected for known factors and biases (including refraction), and that all data sets are available on magnetic tape in SPEAR compatible format. In addition it will be assumed that only time is measured accurately, and that all other data are subject to systematic and/or random error. Tracking data will be assumed to reflect solely the vehicle motion with measurements contaminated by random noise. Telemetered data on the other hand are assumed subject to constant scale factor and bias errors.

Now the reconstruction of a trajectory requires, as a minimum, knowledge of the acceleration histories in an inertial frame of reference. Double differentiation of the radar data is one potential approach, however the noise on the data, especially on angle measurements, is generally sufficient to preclude a meaningful and useable acceleration profile. The approach taken in program SPEAR is first to correct the accelerometer and rate data for misalignment, scale factors and biases by defining a realistic error model and adjusting the parameters of this error model using the Kalman filtering technique which is described more fully in following sections. These adjustments are made by fitting a computed trajectory to the observed radar data in a least squares sense. The result of this is a best estimate of the actual trajectory and of the true acceleration and attitude histories. Best estimates are also obtained of the angular misalignments and other error model parameters. For program SPEAR, the true acceleration is assumed to be linearly related to the measured value. Thus for each transducer the measured value, a, at each time point is factored and biased. Also, the rates are assumed to be in error by constant gyro drift rates.

It is possible to obtain best estimates of up to 21 parameters in this first fit. These are

ΔX_o, ΔY_o, ΔZ_o - initial position errors
$\Delta \dot{X}_o$, $\Delta \dot{Y}_o$, $\Delta \dot{Z}_o$ - initial velocity errors
f_1, f_2, f_3 - accelerometer calibration factors
b_1, b_2, b_3 - accelerometer calibration biases
φ, θ, ψ - orthogonal accelerometer misalignments
ω_{D1}, ω_{D2}, ω_{D3} - gyro drift rates
φ , θ , ψ - non-orthogonal accelerometer misalignments

It is usually not necessary to include position and velocity errors for the first stage analysis, since pad position and velocity are well known. Experience will dictate whether it is necessary to solve for all 21 parameters for analysis of subsequent stages, as it is possible that the assumption of a constant error model is not valid over several thrusting stages.

With the error model parameter values established, best estimate body acceleration and attitude histories are computed for the next phase of the analysis. These histories become the observations (equivalent to the radar and/or Doppler observations for the first phase) for the second phase in which best estimates are obtained for aerodynamic and propulsion parameters. Use is again made of the Kalman technique. The aerodynamic and propulsion error model parameters are adjusted to satisfy in the least squares sense the previously corrected acceleration and attitude histories. Here it is assumed that the actual histories deviate from the predicted histories due to imprecise knowledge of the system as defined by the aerodynamic and propulsion parameters. The net effect of the Kalman filter is to apportion these deviations among the parameters in the most likely way.

A total of 30 error parameters may be solved for in phase 2. A list of these follows. For complete understanding of the parameters, reference should be made to the theoretical development section of this report.

1	ϵ	thrust misalignment pitch angle
2	ν	thrust misalignment yaw angle
3	b_{Pc}	head cap pressure bias

4	C_N	propellant flow rate factor
5	K'	factor on jet vane force coefficients
6	K'_F	bias on jet vane force coefficient variation with position
7	K'_{Fo}	bias on jet vane force coefficient at null position
8	C_{a1}	atmospheric density factor
9	C_{a2}	atmospheric density exponent
10	ΔC_{D01}	parameters for $\Delta C_{D0}(M)$, drag coefficient
11	ΔC_{D02}	
12	ΔC_{D03}	
13	ΔC_{D04}	
14	ΔC_{D1}	parameters for $\Delta C_{D\alpha_T}(M)$, drag coefficient factor on total angle of attack squared
15	ΔC_{D2}	
16	ΔC_{D3}	
17	ΔC_{D4}	
18	ΔC_{N01}	parameters for $\Delta C_{N0}(M)$, pitch plane force coefficient bias
19	ΔC_{N02}	
20	ΔC_{N03}	
21	ΔC_{N04}	
22	ΔC_{N1}	parameters for $\Delta C_{N\alpha}(M)$, pitch plane force coefficient factor on angle of attack
23	ΔC_{N2}	
24	ΔC_{N3}	
25	ΔC_{N4}	
26	ΔC_{CP1}	parameters for $\Delta l_{xzcp\alpha}(M)$, roll axis center of pressure, in the x,z body plane, factor on angle of attack
27	ΔC_{CP2}	
28	ΔC_{CP3}	
29	ΔC_{CP4}	
30	V_{Wb}	wind velocity magnitude bias

A Descriptive Outline of the Kalman Filter

The fitting process in program SPEAR uses the Kalman filtering technique to optimize an estimate. Some understanding of the mechanics of the Kalman filter is helpful in exploiting its capabilities. The technique is fundamentally a least squares fitting to a set of data and an initial estimate. It minimizes the sum of the weighted squares of the residuals, residuals being defined as the differences between the observations and their computed

values. In the recursive form it has the advantage that it processes the observations one set at a time. In the post flight situation this means that much more data may be used in the fitting process than with methods in which a fit is made to all data simultaneously. Note also that the solution after each observation set has been processed is the optimum least squares solution up to the time of these observations.

The Kalman solution is generally presented as a recursive set of four equations. The derivation of these involves advanced abstract concepts which are not necessary for an understanding of their operation. A mathematical treatment of the post flight problem is presented in the theoretical section of this manual and will not be duplicated here. It will be sufficient to consider the implication of the equations in the updating process.

A two-dimensional problem. - It will be instructive to consider a simple two-dimensional problem to illustrate the salient features of the process. Extension to the Scout performance problem will then be more readily accomplished. Thus suppose we have an ordered sequence of points lying in the y-t plane and we make measurements of the ordinates of each point. We assume that the time is known exactly, but that the measurements are subject to random uncertainties with zero mean and variance $Q = \sigma^2$. Suppose also that the model assumed for the process generating the data points is

$$y = a + bt = (1 \ t) \begin{pmatrix} a \\ b \end{pmatrix}$$

Here, a and b are the constant components of the state vector, x, and the transition matrix is the 2 x 2 identity matrix. A best estimate of this state vector is desired.

The recursive Kalman solution is not self-starting and requires an initial estimate of the state vector, $\begin{pmatrix} a_o \\ b_o \end{pmatrix}$, with its associated uncertainty

$$P_o = \begin{pmatrix} \sigma_a^2 & \sigma_{ab} \\ \sigma_{ab} & \sigma_b^2 \end{pmatrix}$$

The first step is to use the initial estimate and the model to predict the first measurement, and also compute the uncertainty in the prediction. In general there will be a difference between predicted and actual measurements due in part to errors in the assumed x_o and in part to the random noise on the measurement (assuming a perfect model). This difference is then operated on by a multiplier which takes into account the relative confidence in the prediction and measurement accuracies, and a correction is computed to adjust x_o to its new updated value $\hat{x}_1$. (The $\wedge$ indicates that this is an optimum least squares estimate.) With the addition of the information contained in the measurement, the uncertainty of the updated $\hat{x}_1$ is reduced. The Kalman solution takes cognizance of this by adjusting the uncertainty matrix:

$$P_o \longleftarrow P_1$$

The cycle is now complete and the program is ready to process the next data point using $\hat{x}_1$ as the initial estimate of the state vector and P_1 as the associated uncertainty. The sequence is subsequently repeated as often as necessary to process all the data. Note that at the end of each update cycle, the corresponding $\hat{x}_i$ is the optimum least squares solution up to the time of the current observation.

The solution obtained is unique for the specific case presented. However results may be influenced to a certain extent by judicious definition of the problem. Reference to the Kalman equations indicates that the solution for a given data set is a function of

- the initial estimate of the state, x_o
- the initial covariance matrix, P_o
- the data variance, Q

The influence of each of these factors on the final solution $\hat{x}_f$ (compared with a known solution) and its covariance P_f has been studied and the conclusions are discussed below.

As noted above, the Kalman solution is essentially a least squares fit to the data and the initial estimate. The data uncertainty is assumed to be random about each true value, while the x_o uncertainty may be regarded as essentially a bias type error. Intuitively one would therefore expect that

the closer x_o is to the correct answer, the closer $\hat{x}_f$ would be to the correct answer. One would further expect that, for equal weighting of data and x_o, the effect of x_o would be diluted approximately in proportion to the number of data points. Controlled tests confirm these expectations leading to the conclusion that for optimum results, the best available estimate of x_o should be used, particularly if the data quantity is small. P_f, of course, is completely independent of x_o.

Consider now the effect of varying P_o, other variables being held constant. P_o is a measure of the confidence in the assumed x_o. If confidence is low and P_o correspondingly large, then the early updates will tend to disregard x_o and follow the data. The random noise on the data may cause large initial changes which are increasingly damped out as the uncertainty matrix is reduced in the updating process. If the confidence in the assumed x_o is high and P_o small, the noise on the data will have small effect even at the early updates. Thus it is found that for reasonable quantities of data $\hat{x}_f$ and P_f are almost independent of P_o. (This conclusion must however be modified when the model is not an accurate representation of vehicle performance.)

Similarly, controlled tests show that a small data variance, Q, will force the early updates to follow the noise on the data and ignore x_o. These early large changes are again damped out as the uncertainty matrix is reduced. For larger data variances, the magnitudes of the changes in following the noise are smaller, but the randomness ensures that the final solution is relatively unaffected. Thus $\hat{x}_f$ is essentially independent of Q. On the other hand, P_f is strongly affected by Q and can be shown to vary approximately inversely with Q.

Problem definition may also be varied by assuming that the value of one or more of the components of x_o are known exactly and are not to be updated. This is accomplished by setting the appropriate variance and covariance terms in P_o to zero (that is, no uncertainty). The result is the least squares solution to the remaining parameters, given the known parameters.

Finally, it should be noted that the form of the equations implies that it is relative uncertainties that are important in determining the solution. This applies when considering the magnitudes of the P matrix relative to the Q matrix. It also applies when considering the magnitude of one component of the P or Q matrix relative to any other. Thus these matrices need not reflect strictly the variances of the respective parameters, and in many practical situations, "weights" based on engineering judgement will replace the variances.

The Kalman technique is thus seen to be a highly flexible and versatile tool. It has capability in a range of situations by appropriately defining the problem in terms of x_o, P_o and Q. Its use in SPEAR is discussed in the next section.

The filter applied in SPEAR. - With the mechanics of the Kalman filter illustrated by a simple example, the extension to the problem to be solved in SPEAR is primarily one of dimensions. The basic sequence of steps of the Kalman recursive solution is the same whether the problem is to determine the slope and intercept of a straight line or to establish the best values of the propulsion and aerodynamic error model parameters for the Scout vehicle. Instead of a single data point, the observations may consist of a set of tracker measurements -- slant range, azimuth angle and elevation angle, for example. The data uncertainty Q will then be a symmetric (usually diagonal) 3 x 3 matrix. The state vector, its initial estimate and the associated uncertainty will depend upon the specific problem to be solved.

Consider the case of fitting an ellipse to a vacuum coast portion of the Scout trajectory. The state vector will consist of six components (radius, latitude, longitude, velocity, flight path angle, azimuth, or the equivalent set of cartesian position and velocity components) at a reference time, and the uncertainty matrix will be a symmetric 6 x 6 matrix. The initial estimate, x_o, and associated uncertainty, P_o, will depend upon the specific circumstances. Usually, the best available estimate will be one of the following:

- the preflight vector at some significant time or event on the coast ellipse (stage burnout, for example). A typical P_o matrix might consist of estimates of the variance for each component, with zeros off the diagonal. (More exactly, one might include covariance terms, but these are generally not necessary. As noted in the previous section the influence of P_o on the solution is small.)

- the vector on the ellipse derived from the reconstruction of an immediately preceding powered stage. The P_o matrix would be available from the same reconstruction.

- a vector on the ellipse obtained from an independent source along with the associated uncertainties.

- a self-start. If desired, x_o will be computed by the program using a polynomial fit to the radar.

In program SPEAR the analysis of the Scout vehicle performance is divided into two distinct phases. In the first of these the Scout accelerometer and rate data are compared with the tracking radar. It is assumed that the errors may be represented by factors and/or biases on the data. The state vector for phase 1 thus consists of 15 factors and biases. In addition provision is made for including biases on the components of position and velocity at the reference time. These may be required in analyzing Scout stages after the first if there is uncertainty in the position and velocity at stage ignition. If such errors exist and are not accounted for in the model, the solution will contain an "equivalent" adjustment in the included state vector components.

As in the simple example of the previous section, the first step in the update sequence is to predict the next observation and the uncertainty in the prediction. In general there will be a difference between the predicted and actual observations due in part to inaccuracies in the state vector and in part to noise on the tracker measurements. A correction multiplier on this difference is computed, taking into account the relative prediction and measurement accuracies, and the appropriate adjustments are made to the state

vector components to minimize the residuals in the least squares sense. In addition the uncertainty matrix is adjusted to take account of the information content of the latest observation. The sequence is then repeated as often as required until all observations have been processed. The final update of the state vector gives the optimum estimate consistent with the initial estimate and the tracking observations. The optimum values are used in generating the phase 1 output tapes for input to phase 2 of the analysis, and again the sequence of updating is followed. The state vector now consists of parameters reflecting the modelling for the propulsion and aerodynamics.

In each case, the program is performing a simultaneous adjustment to several variables in performing a fit. Thus it is merely performing a multivariable version of the task the post flight analyst has had in the past, using his knowledge of the applicable partial to adjust one parameter value at a time. The program eliminates the "trial and error" aspect of this approach and provides an automated, theoretically sound, best solution for several variables simultaneously in a single pass through the data.

SPEAR Input

Tracking and telemetry data for phase 1 of program SPEAR are input on magnetic tapes. These are output in prescribed formats by auxiliary programs TPGEN and SPFLTR (Appendix A), and are given tape assignments from the list 1, 8, 16, 17, 18, 26. For phase 2 the tapes are obtained as output of phase 1 as well as processed telemetry.

It is also possible, after initialization functions have been performed automatically by SPEAR, to modify set-up values and to supply additional information from cards. Wherever practical, the initialization functions are performed automatically and there is no access to the user. Thus, for example, a value of .017453293 is internally supplied for conversion of degrees to radians. Other values are initialized but are made accessible to the program user for desired changes. For example, the earth's equatorial radius is initialized R_E = 20925741., but may be changed if an alternate model is to be used. The large bulk of card input however will be for program control and supplying necessary data for the particular case.

Card input to program SPEAR is arranged in blocks labelled with letters of the alphabet. Some blocks are reserved for specific types of input -- block A is used for program controls, block E for the state vector, for example. Other blocks such as N and Ø contain miscellaneous information. Within each block, relative addresses are assigned for the required input quantities. To handle the variety of input requirements, a versatile subprogram, INPT, has been developed to interpret and act upon card input prior to program execution.

Subroutine INPT. - Card input is interpreted and acted upon by subprogram INPT which has the flexibility required by the variety of possible input, with only a few basic rules to be observed by the user. Column 1 of the card, if used, concerns the COMMON block letter (A-Z). Columns 2-6, if used, provide the relative address within the current block. Note that there is no restriction with respect to right or left justification of the address within these column limits so that all the following examples are equivalent:

```
1 2 3 4 5 6 7 - - -
A 9
A b 9
A b b 9
A b b b 9
A b b b b 9
```

All remaining columns 7-80 may be used for data input.

More than one quantity may be input per card provided at least one blank column separates the quantities. The physical length of the data field is the only other restriction in this respect. The first quantity automatically goes into the current address and each subsequent data input is automatically assigned to the next address with more than one blank between quantities being ignored. Additional features of INPT are that it is necessary to establish the block only on the first card in a series, that it is necessary to specify the starting address within that block only if it is different from 1, and that for each subsequent non-addressed card the first data input is automatically assigned the relative address immediately following the last address on the previous card. Thus a table of body rates could be input as follows:

1	2	7				
S			t_1	$\dot{\varphi}_1$	$\dot{\theta}_1$	$\dot{\psi}_1$
			t_2	$\dot{\varphi}_2$	$\dot{\theta}_2$	$\dot{\psi}_2$
			t_3	$\dot{\varphi}_3$	$\dot{\theta}_3$	$\dot{\psi}_3$

Address assignment would be:

S1 $\leftarrow$ t_1
S2 $\leftarrow$ $\dot{\varphi}_1$
S3 $\leftarrow$ $\dot{\theta}_1$
S4 $\leftarrow$ $\dot{\psi}_1$
S5 $\leftarrow$ t_2
S6 $\leftarrow$ $\dot{\varphi}_2$

While the address is not column sensitive for quantities within the data field, the printout can be made to appear as a table by attention to the starting column for each quantity. The user should be cautioned however of the problem involved in the event of a dropped deck containing several such non-addressed tables, and use discretion in omitting address information from input cards.

Data may be input in any form - integer, F-format, E-format, alphanumeric - as required by the program. Normal FORTRAN conventions hold with an additional E-format variation for convenience in key-punching. Thus the input 1.76+16 (with no blanks) is interpreted as 1.76×10^{16}, and -9.32-4 is interpreted as -9.32×10^{-4}. Also, alphanumeric data may be input as words or in Hollerith, e.g. 1WTAPEID and 6HTAPEID are equivalent.

Program INPT recognizes that an opening parenthesis, (, in the data field signals that the rest of the card is a comment or message which is to be printed out along with the other input but not acted upon. This feature is useful for keeping track of computer runs and identifying data input. Examples are:

1	2	7
		$(\text{THIS}_b\text{IS}_b\text{A}_b\text{SCOUT}_b\text{BURN}_b\text{1}_b\text{TRAJECTORY}$
		$(\text{RATE}_b\text{TABLE}_b\text{FOLLOWS}$
		(TIME R-RATE P-RATE Y-RATE
S	1	xxx.xx x.xxxx x.xxxx x.xxxx
S	5	xxx.xx x.xxxx x.xxxx x.xxxx
N	37	.xxxxxx $(\text{INITIAL}_b\text{ROLL}$
N	38	xx.xxxx $(\text{INITIAL}_b\text{PITCH}$
N	39	x.xxxxx $(\text{INITIAL}_b\text{YAW}$

INPT also has an arithmetic capability, using standard FORTRAN notation. The request for an operation is recognized by the combination of the symbol with a blank in both adjacent columns

$$b + b$$
$$b - b$$
$$b * b$$
$$b / b$$

Several operations may be performed in sequence (note this difference from FORTRAN), and the arithmetic capability is useful when it is desired to have the input print-out components of the quantity in one unit for ease of checking, but the program expects a single quantity in another unit. Similarly input of the average of two quantities might be accomplished by a card reading

$$38500.{}_b+{}_b41750.{}_b/{}_b2.$$

which would be interpreted as

$$\frac{38500 + 41750}{2}$$

Another feature incorporated in INPT may be explained with reference to the following example

1	2	7
A	1	$1_b\text{R}4_b0_b\text{S}3_b370.56$

The R4 designates that the 1 be repeated for the next four addresses. S3 designates a skip over the next three addresses. The input is thus interpreted as

```
A1        1    }
A2        1    }
A3        1    }
A4        1    }  Repeat "1"  4  times
A5        1    }
A6        0
A7             }
A8             }  skip, i.e. no change
A9             }  to these addresses
A10       370.56
```

Finally a block letter Z in column 1 is interpreted by the INPT subroutine as ending card input for the current case. When the Z card is encountered, control is returned to the calling program and execution of the case commences with the parameter values now stored.

The program automatically prints out all input cards, supplying the block name and range of relative addresses on each card containing data. Thus a card with a single data input would have a print-out similar to

```
A     10-     10     xxx.xx
```

and with multiple inputs,

```
N     37-     39     x.xxx     xx.xx     x.xxx
```

It is to be emphasized that every card is printed out and a specific relative address may be referenced several times. Each reference causes that input to replace the value previously stored, and the value at the final reference is the one used in the execution of the case. When checking listings of input cards, the user must establish that the last reference to an address has the desired input.

APPENDIX F

MONTHLY RESOURCES

APPENDIX F

During the course of the Scout Management contracts a resources utilization graphic presentation by the prime contractor is submitted monthly. A sample portion of the September 1972 presentation of contract NAS1-10000 is duplicated in appendix F.

The charts presented depict the following data:

Figure 97 - Total Expenditures.

Figure 98 - Direct Materials.

Figure 99 - Direct Charges.

Figure 100 - Total Manpower.

Figure 101 - Engineering Manpower.

Figure 102 - Manufacturing Manpower.

Figure 103 - Project Office Manpower.

Figure 104 - Quality Control Manpower.

Figure 105 - Materials Manpower.

Figure 106 - Tooling Manpower.

Figure 107 - San Marco Expenditures.

Figure 108 - San Marco Manpower.

Figure 109 - San Marco Direct Charges.

Figure 110 - Spares Replenishment Expenditures.

Figure 111 - Special Programs Expenditures.

Figure 112 - Special Programs Manpower.

SCOUT PROGRAM

MONTHLY RESOURCES UTILIZATION GRAPHIC PRESENTATION

NAS 1-10000 WA 3333 3334 3335 3336

C-9

PRECEDING PAGE BLANK NOT FILMED

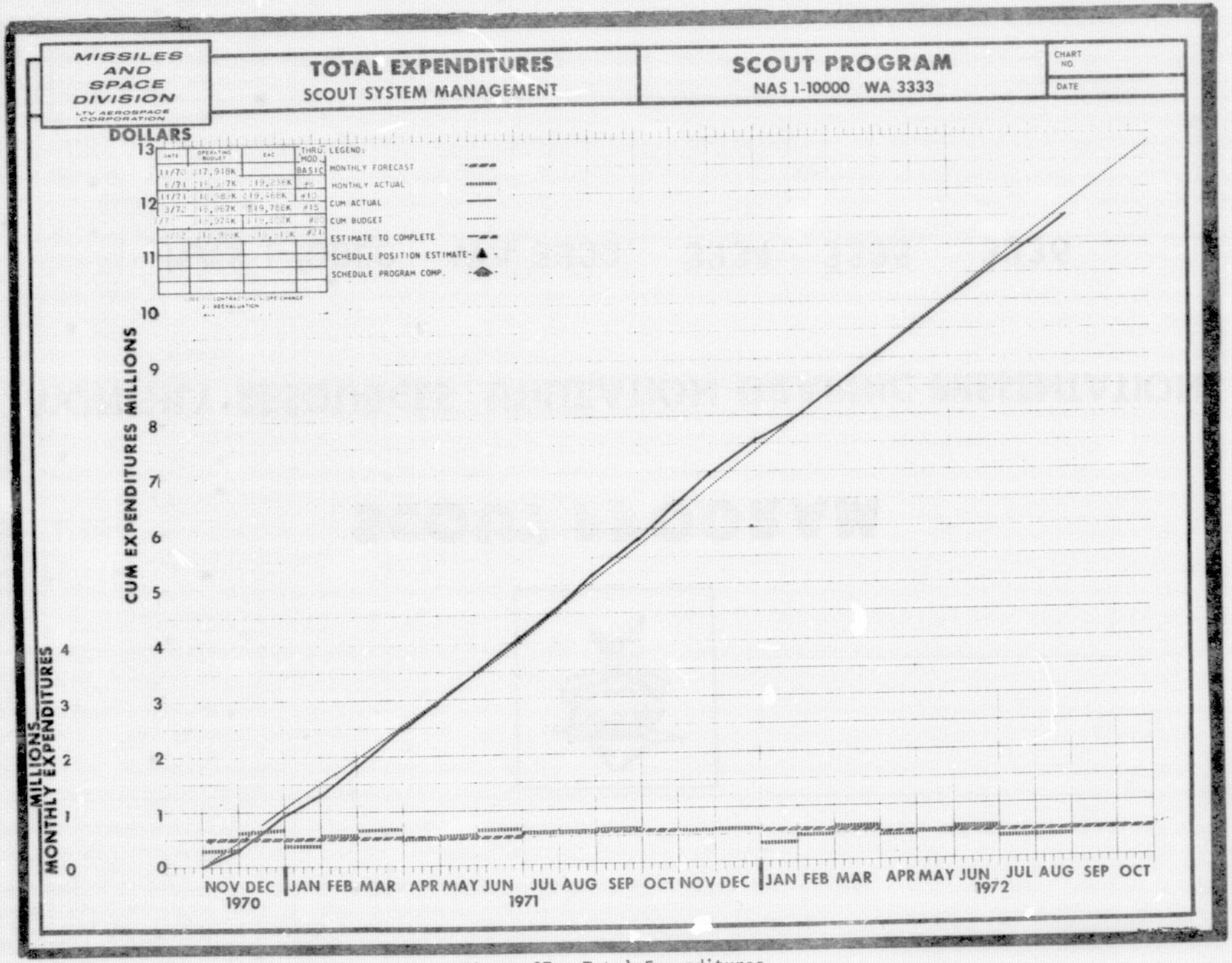


Figure 97.- Total Expenditures

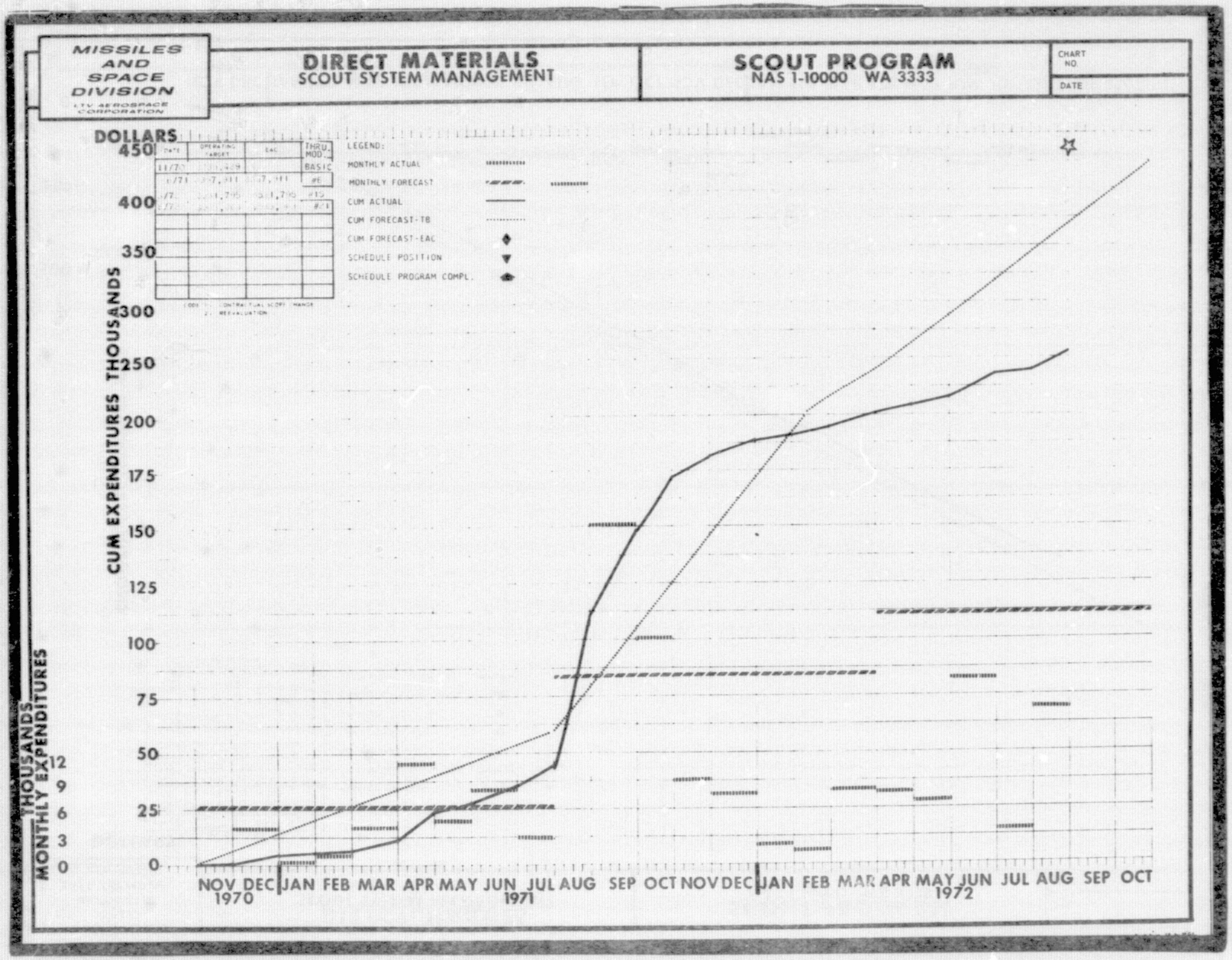
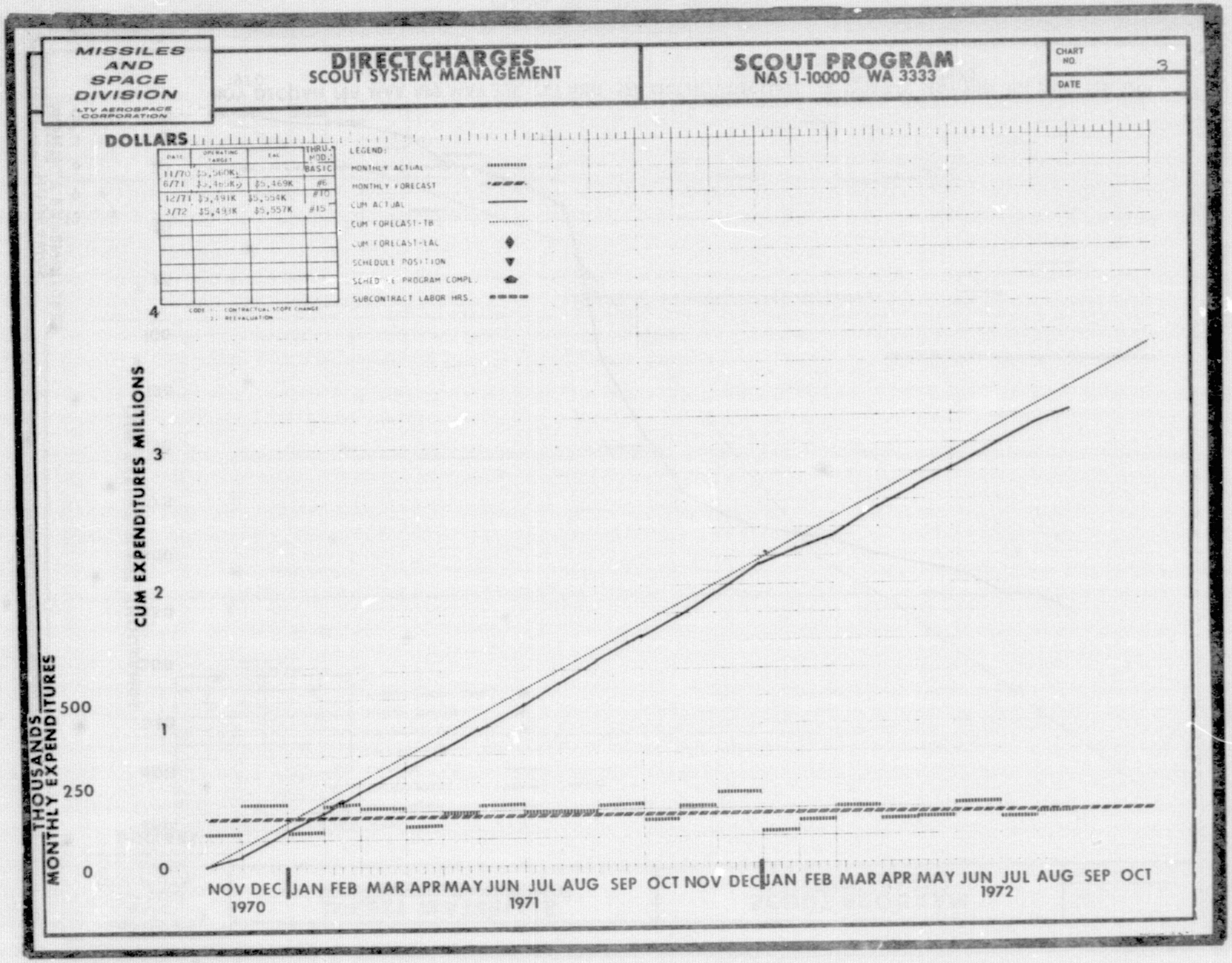


Figure 98.- Direct Materials.



DATE	OPERATING TARGET	EAC	THRU. MOD.
11/70	$5,560K1		BASIC
6/71	$5,465K2	$5,469K	#6
12/71	$5,491K	$5,554K	#10
3/72	$5,493K	$5,557K	#15

Figure 99.- Direct Charges.

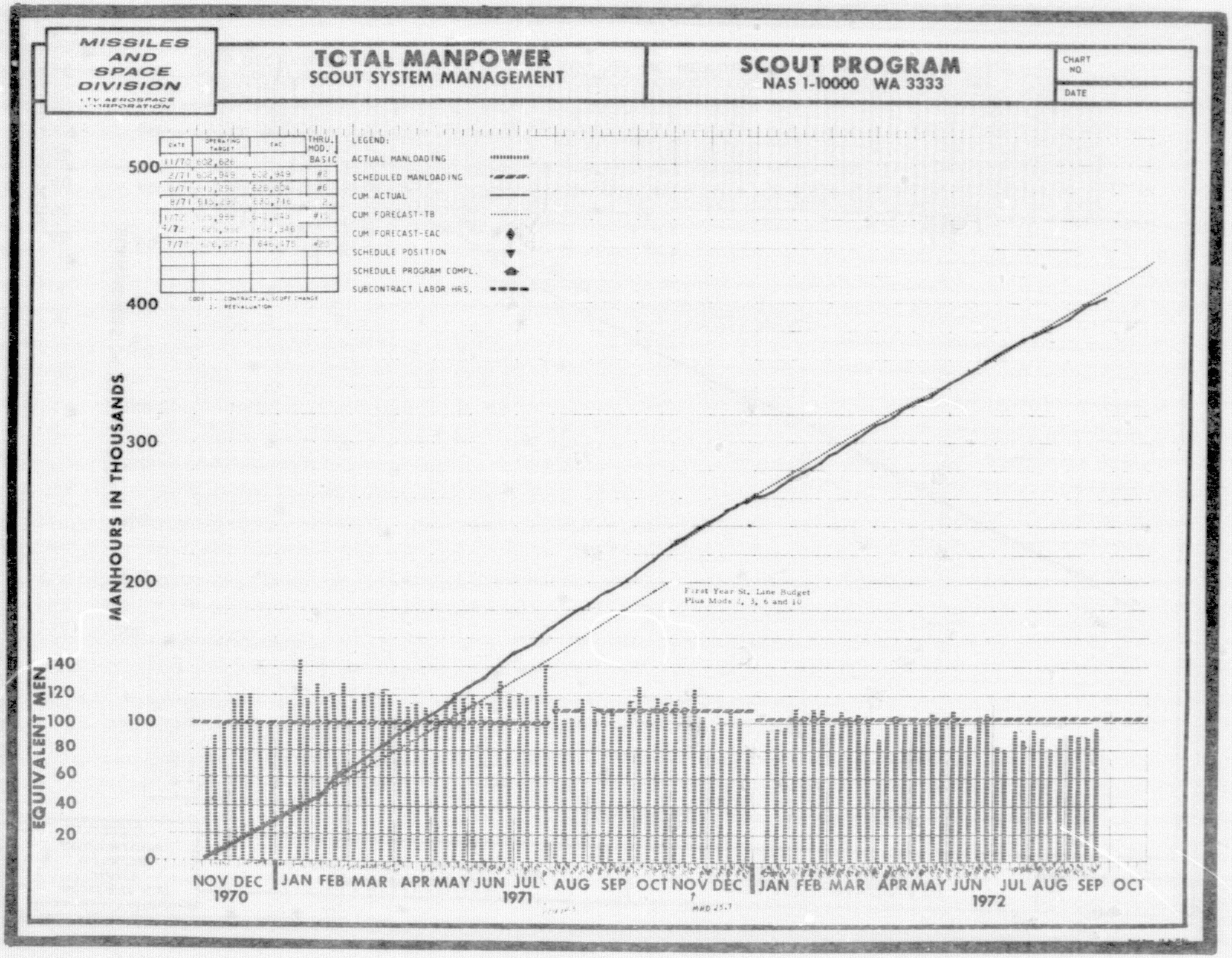


Figure 100.- Total Manpower

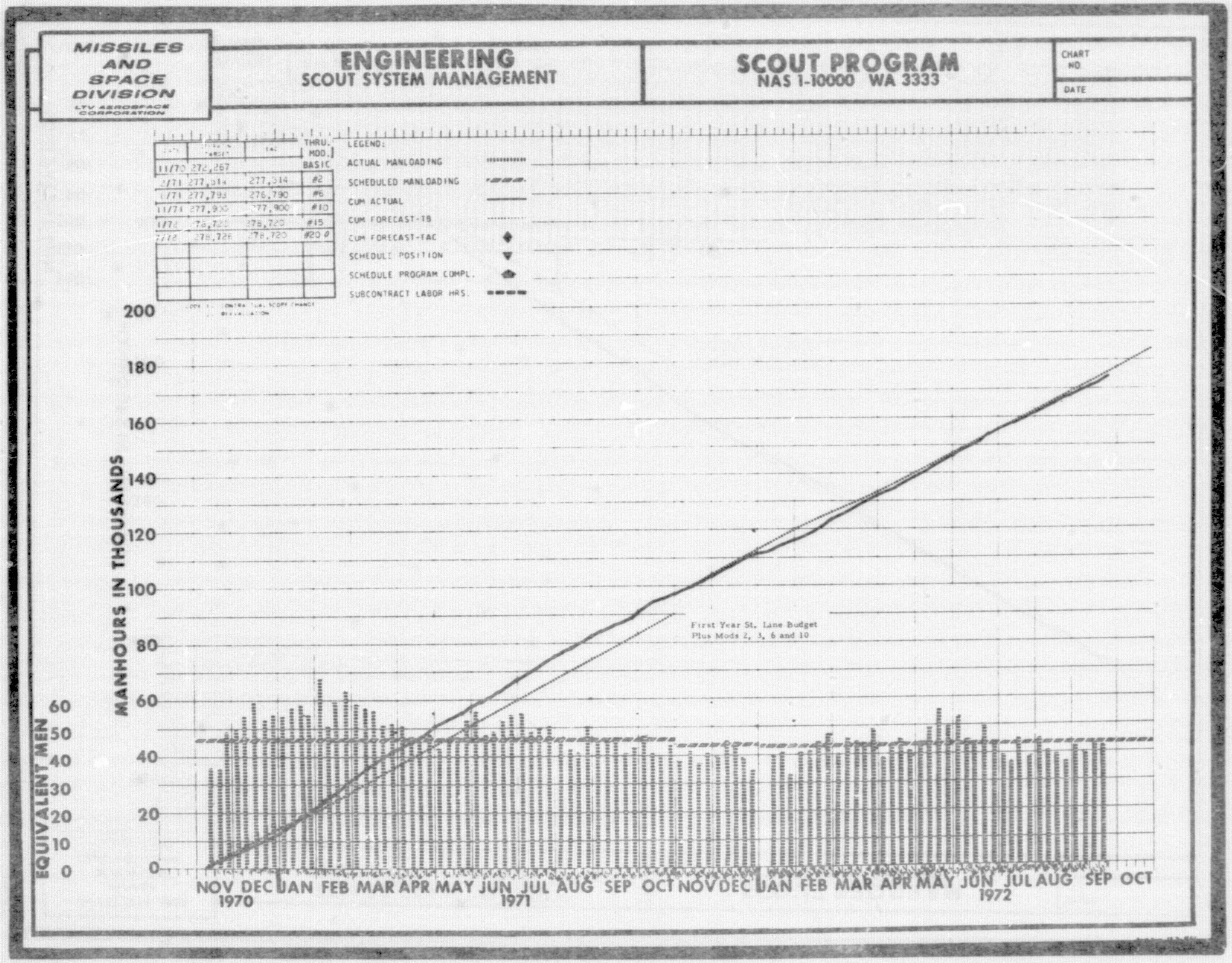


Figure 101.- Engineering Manpower.

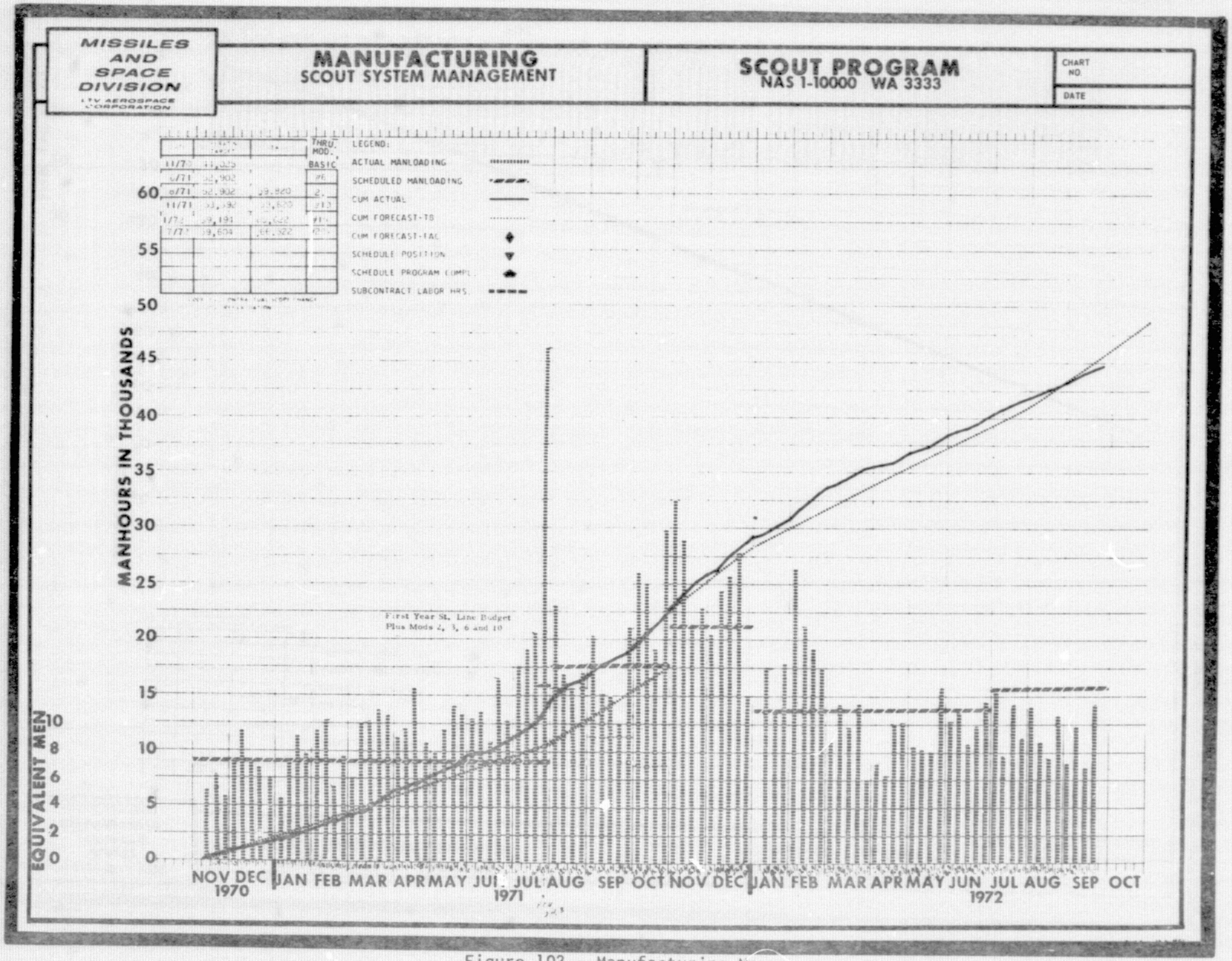


Figure 102.- Manufacturing Manpower.

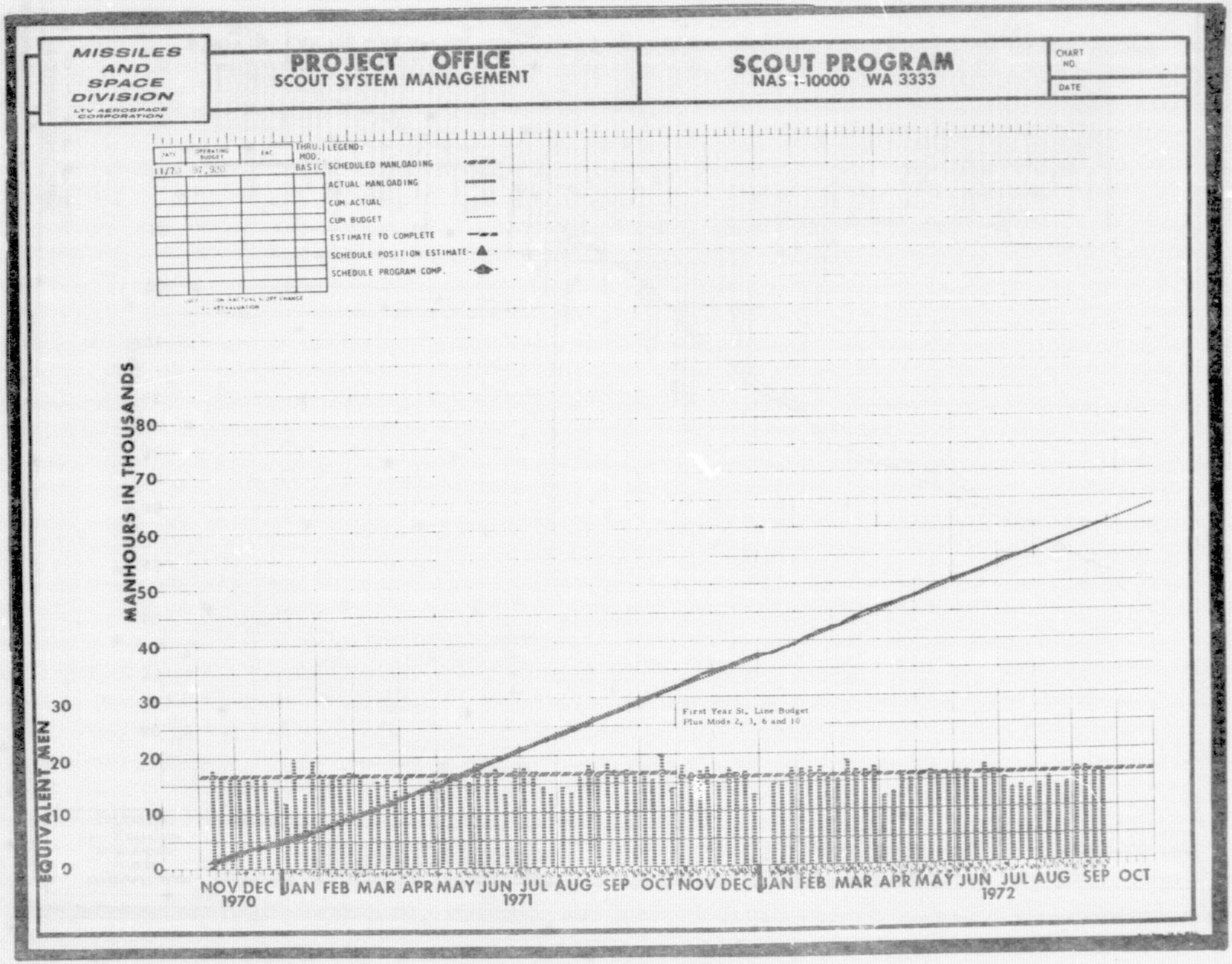
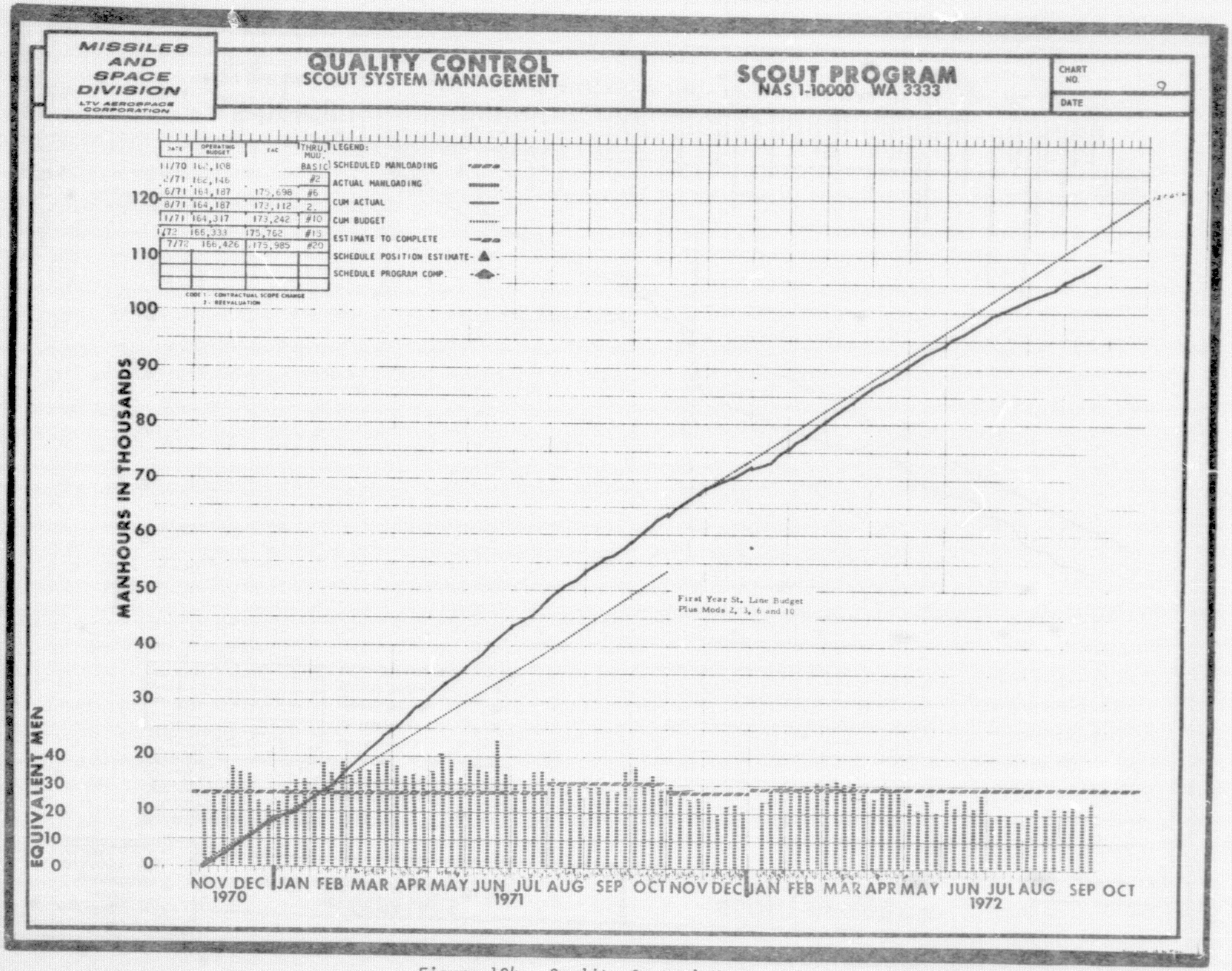


Figure 103.- Project Office Manpower.



DATE	OPERATING BUDGET	EAC	THRU. MOD.
11/70	162,108		BASIC
2/71	162,146		#2
6/71	164,187	175,698	#6
8/71	164,187	173,112	2.
11/71	164,317	173,242	#10
1/72	166,333	175,762	#15
7/72	166,426	175,985	#20

CODE 1 - CONTRACTUAL SCOPE CHANGE
2 - REEVALUATION

Figure 104.- Quality Control Manpower.

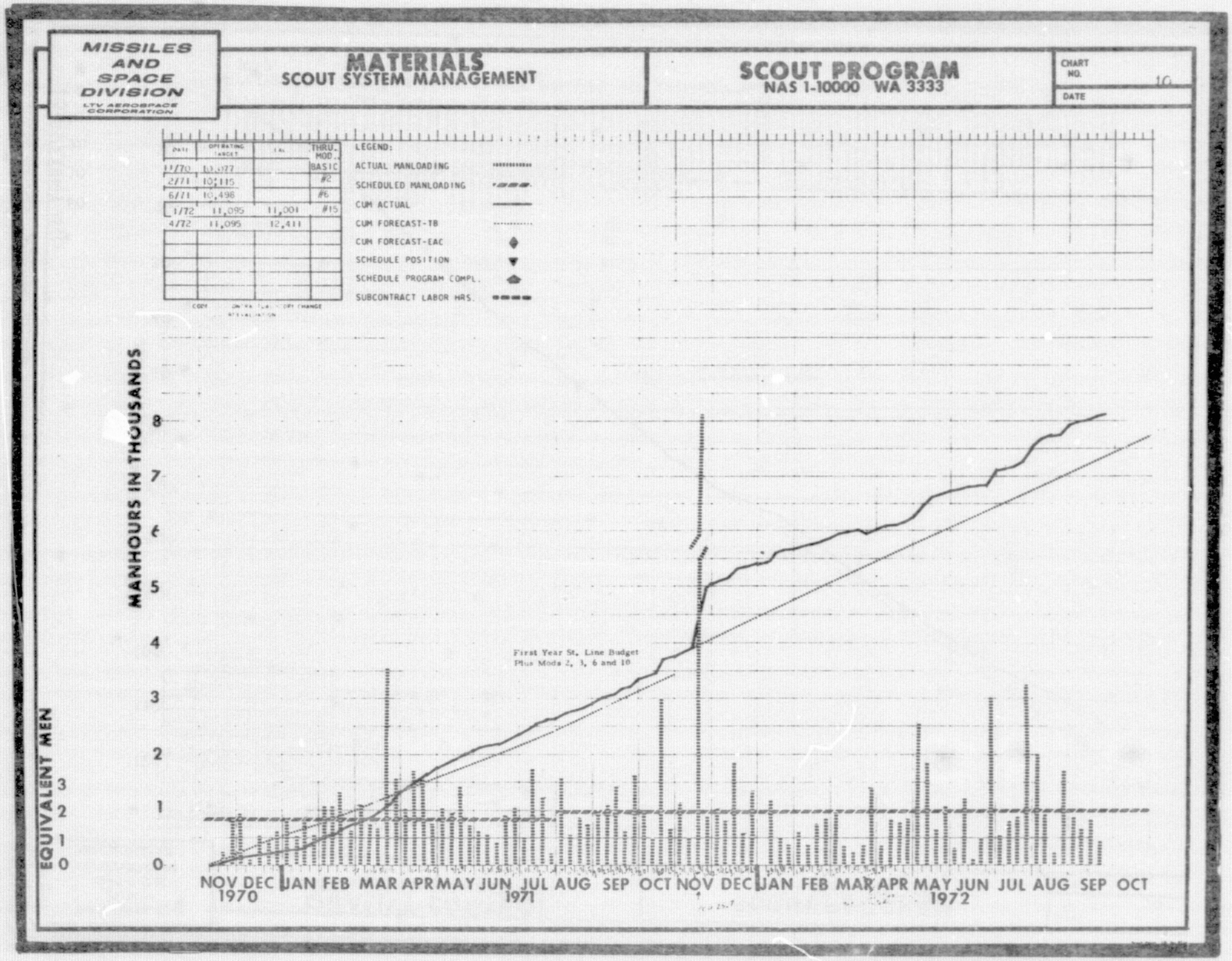
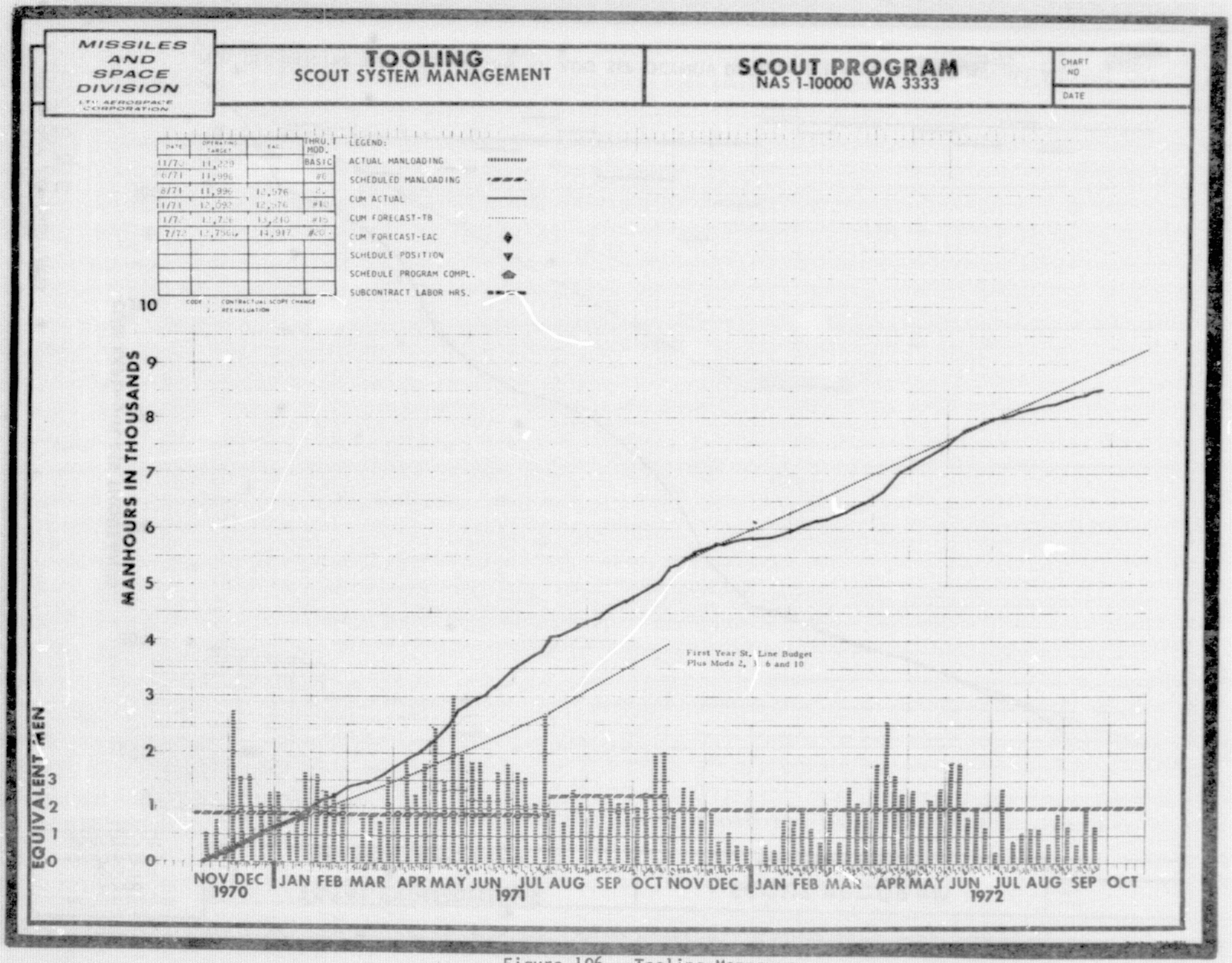
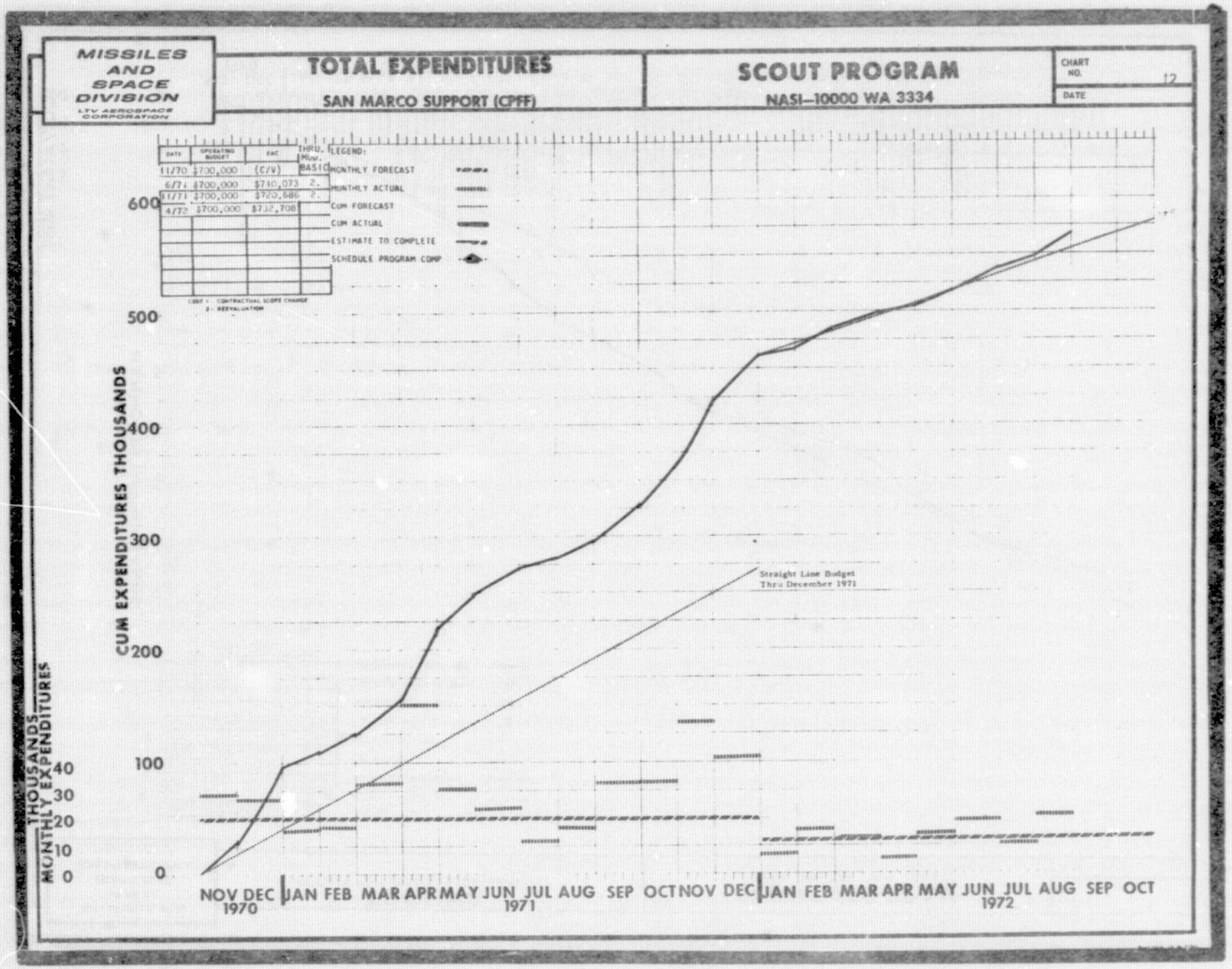


Figure 105.- Materials Manpower.



DATE	OPERATING TARGET	EAC	THRU. MOD.
11/70	11,229		BASIC
6/71	11,996		#6
8/71	11,996	12,576	2.
11/71	12,692	12,576	#10
1/72	12,726	13,240	#15
7/72	12,756	14,917	#20

Figure 106.- Tooling Manpower.



DATE	OPERATING BUDGET	EAC	THRU. MOD.
11/70	$700,000	(C/V)	BASIC
6/71	$700,000	$710,073	2.
11/71	$700,000	$720,686	2.
4/72	$700,000	$732,708	

CODE 1 - CONTRACTUAL SCOPE CHANGE
2 - REEVALUATION

Figure 107.- San Marco Expenditures.

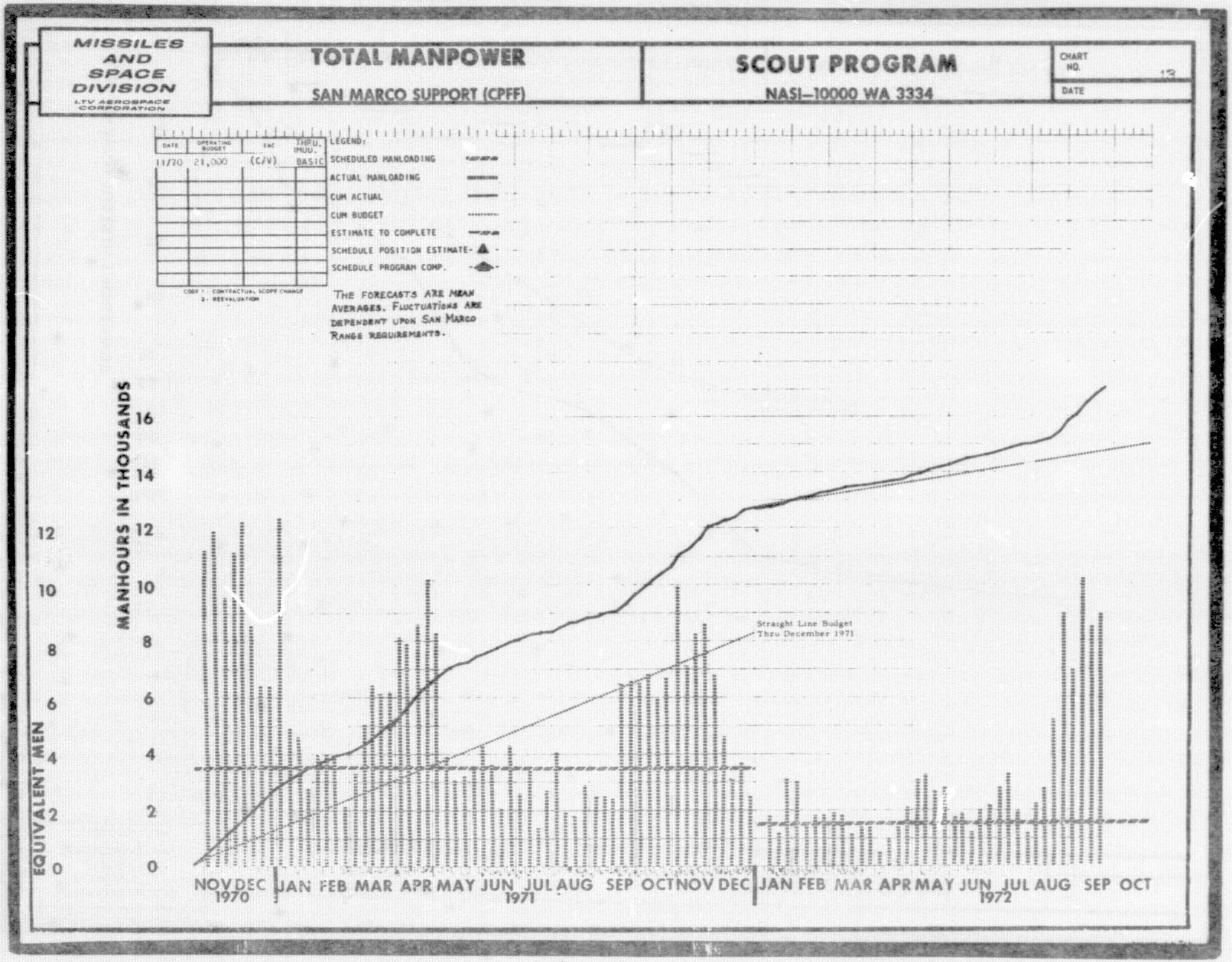
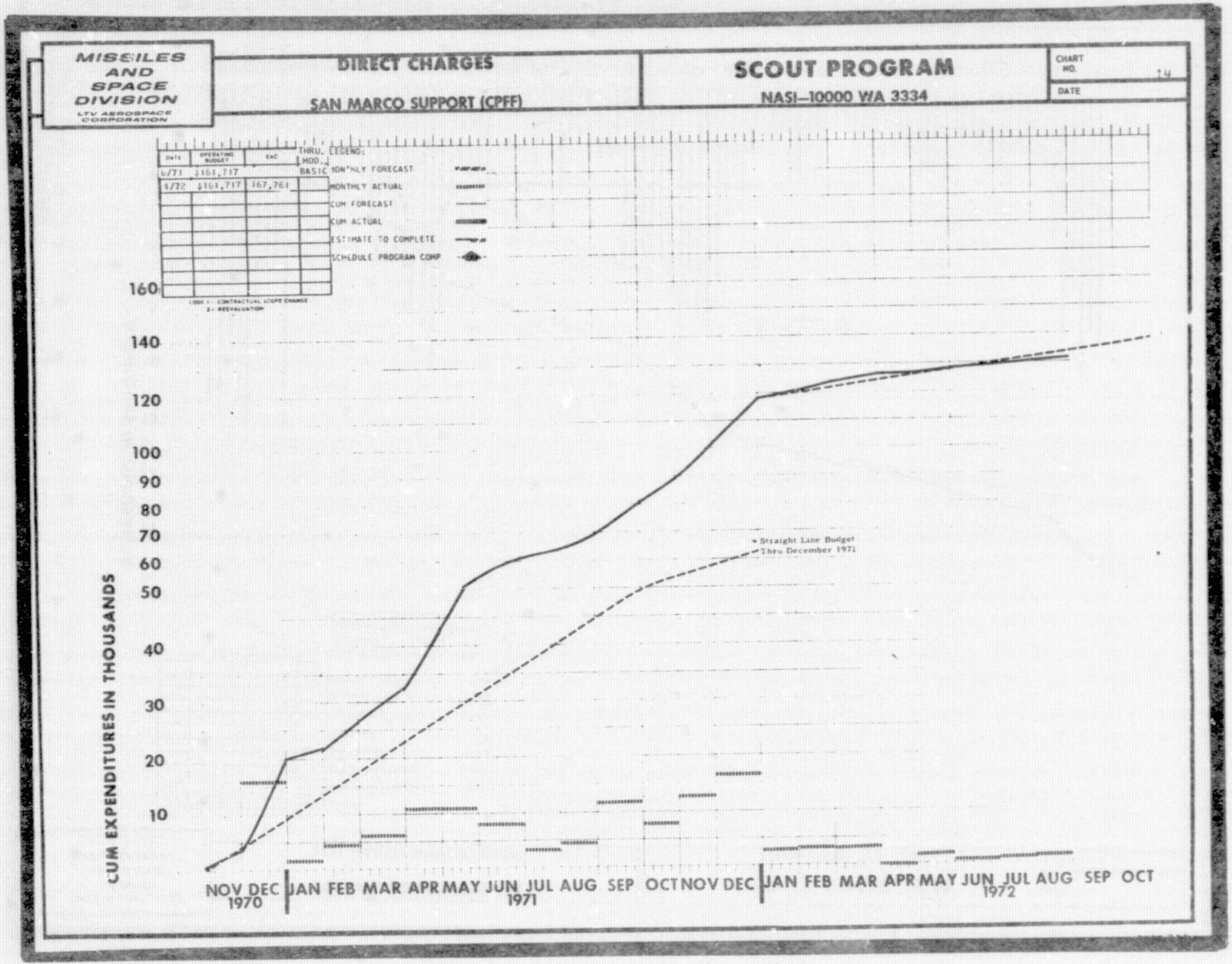
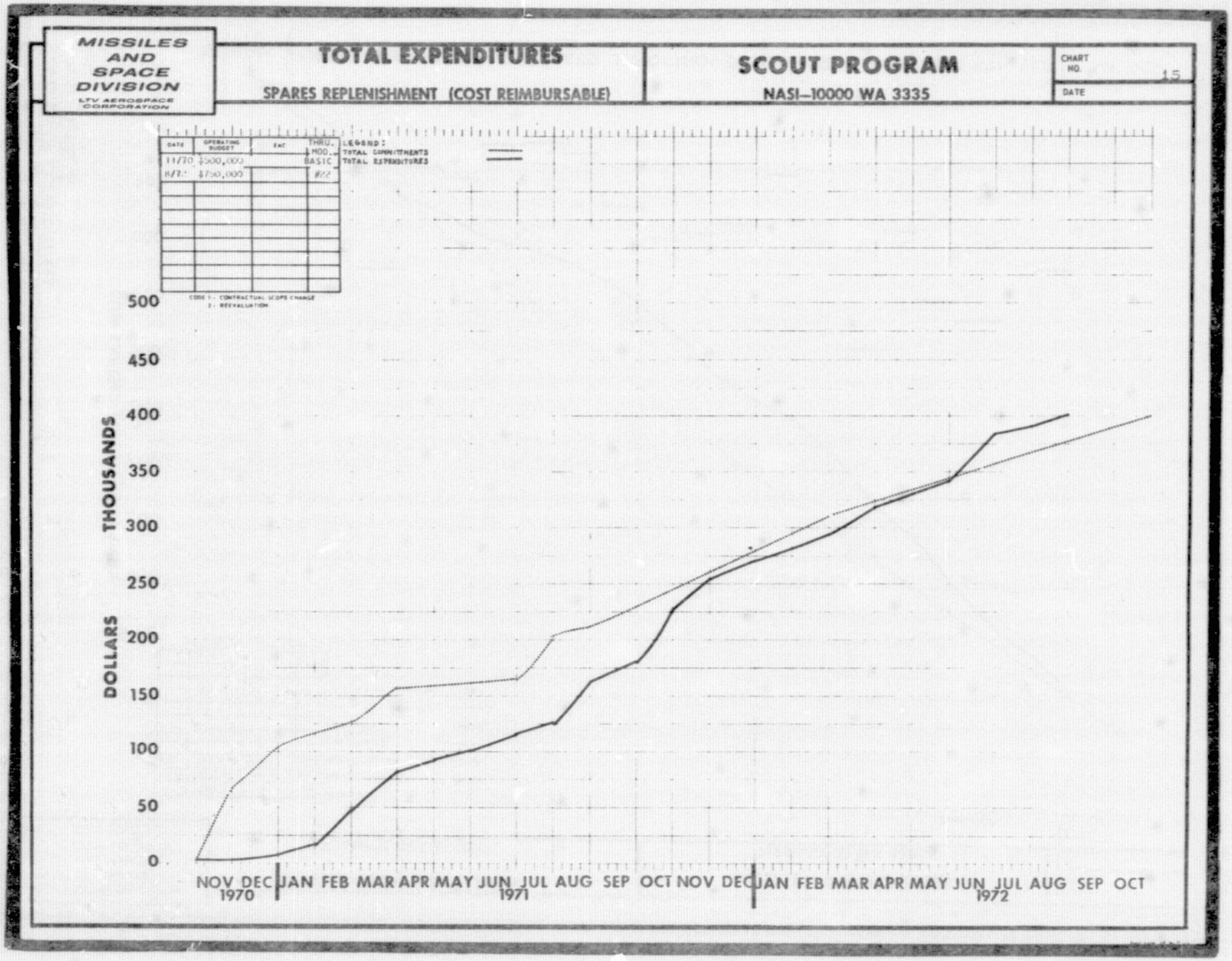


Figure 108.- San Marco Manpower



DATE	OPERATING BUDGET	EAC	THRU. MOD.
6/71	$161,717		BASIC
4/72	$161,717	167,761	

Figure 109.- San Marco Direct Charges.



DATE	OPERATING BUDGET	EAC	THRU. MOD.
11/70	$500,000		BASIC
8/72	$750,000		#22

Figure 110.- Spares Replenishment Expenditures.

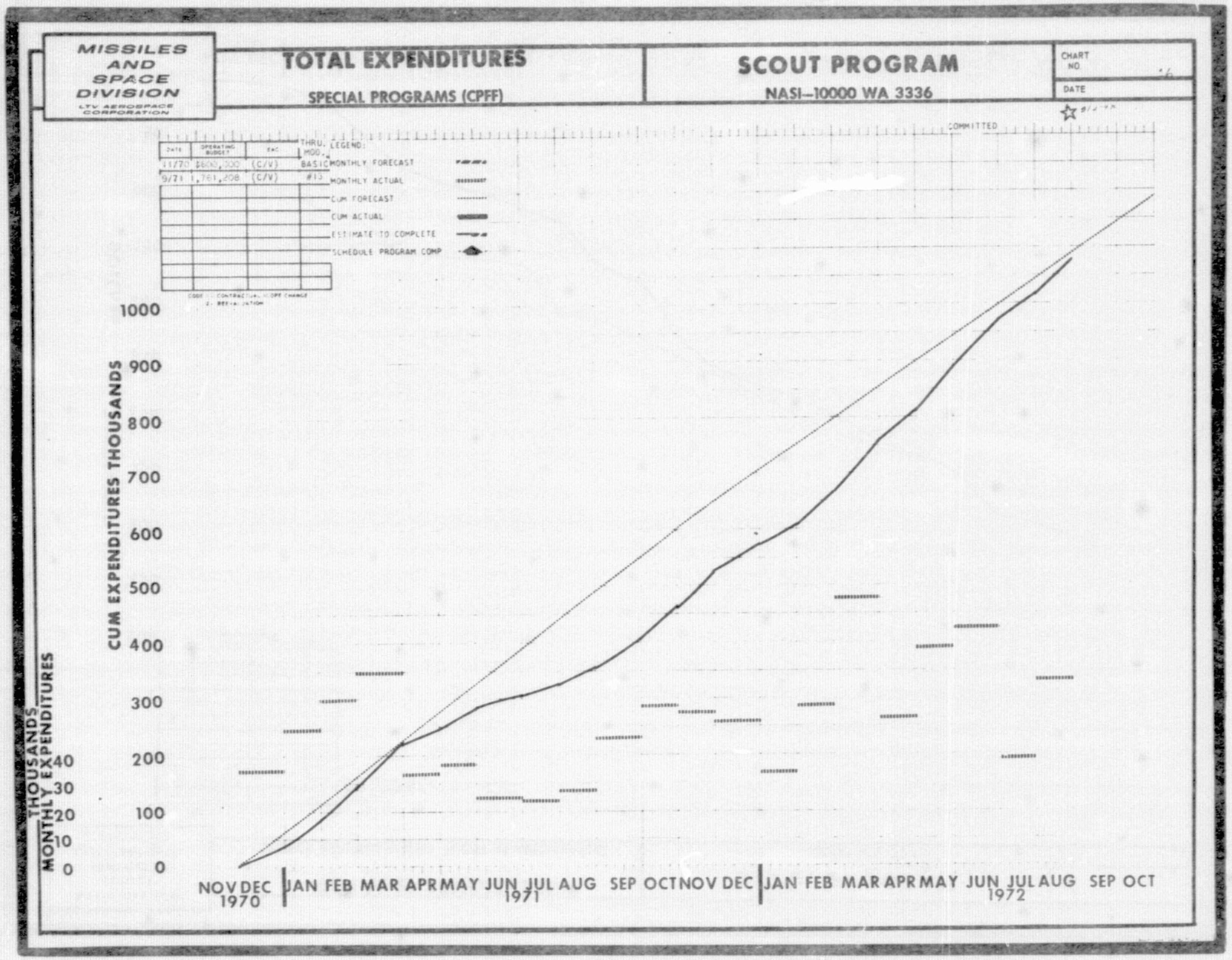


Figure 111.- Special Programs Expenditures.

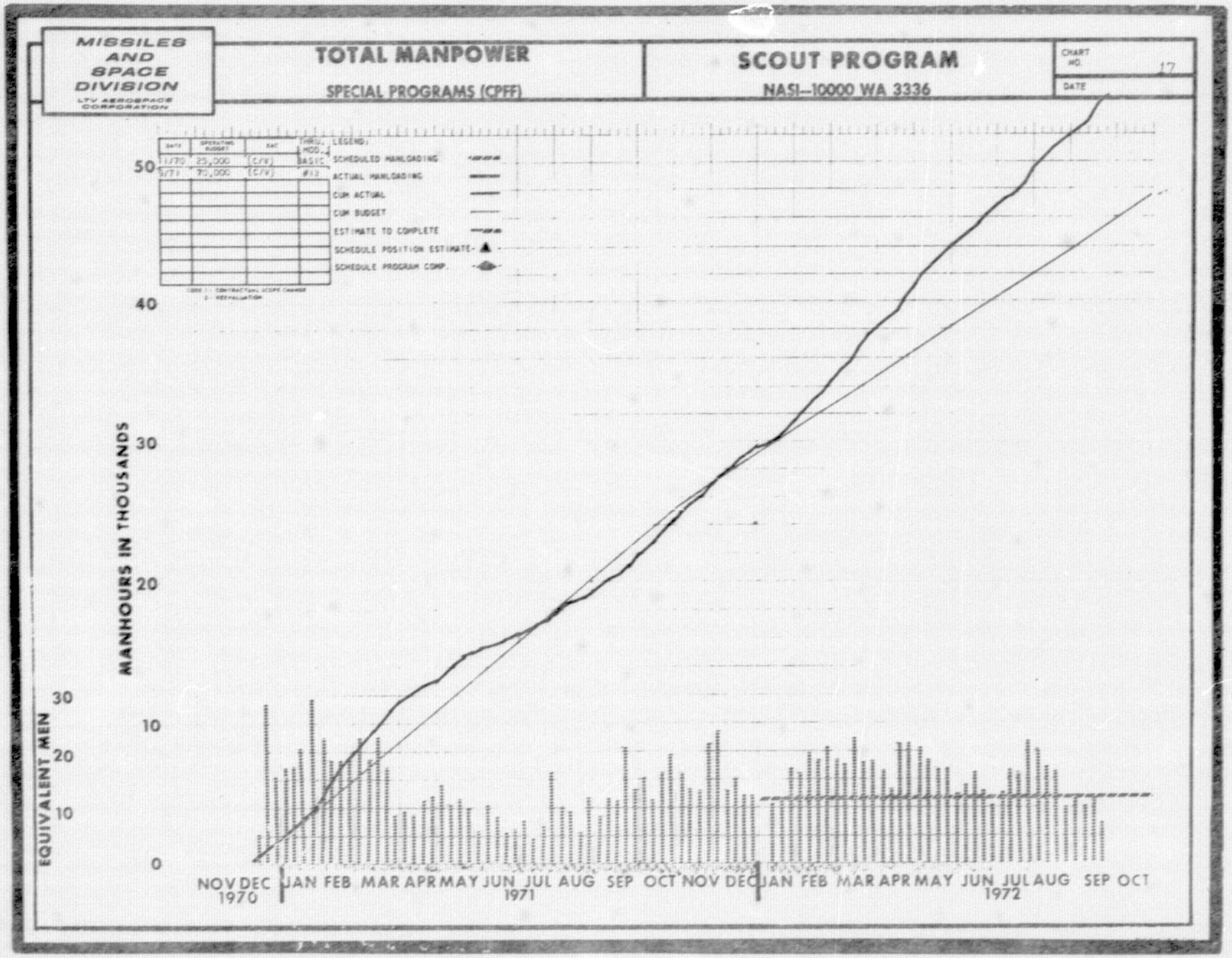


Figure 112.- Special Programs Manpower.

APPENDIX G

ESRO IB

APPENDIX G

The first international reimbursable Scout was contracted to ESRO. The European Space Research Organisation purchased Scout launch vehicle S-172C including software and launch services. The funds were received as Trust Funds and the final costs are itemized in table CCXXXIII. This table shows the detail cost breakdown of the distribution of funds received for ESTEC contract 687.69 and the balance due on the contract. Figure 113 shows the ESRO satellite as it progressed to the launch site.

The ESRO-1 mission and payload were first outlined in 1963 at scientific meetings at COPERS - the European Preparatory Commission for Space Research - forerunner of ESRO.

Feasibility studies carried out for COPERS by Centro Ricerche Aerospaziali, Italy, and Svenska Aeroplan AB, Sweden, were helpful in finalizing the payload.

ESRO put out a call for tenders in 1964 for the design, development, and manufacture of ESRO-1. In April 1965, the contract was awarded to Laboratoire Central de Télécommunications, Paris, as prime contractor in association with Contraves A.G., Zurich, and Bell Telephone Manufacturing Company, Antwerp. Table CCXXXIV shows the main firms participating in the ESRO-1 Project.

Laboratoire Central de Télécommunications was responsible for overall project management and satellite integration; Contraves, Zurich, for structural and thermal design and stabilization; and Bell Telephone Manufacturing Company for power supplies. ESTEC had responsibility for the overall design and was also responsible for environmental test work for design qualification and flight acceptance.

The contract called for supply of two flight units to be ready for launch at Western Test Range, California, originally in September 1967. In 1967 difficulties were encountered in the development of some of the experiments and on-board equipment which finally led to a postponement of the launch until Autumn 1968. (The scientific objectives required an autumn launch.)

The ESRO-1 project was a cooperative venture of ESRO and NASA. The SCOUT launch vehicle (S-167) for ESRO-1A was provided by NASA as well as launch facilities at Western Test Range. The ESRO-1B launch vehicle was purchased by ESRO (table CCXXIII) from NASA.

LTV, Ling-Temco-Vought Inc., of Dallas is contractor to NASA for the SCOUT vehicle. The launches are carried out by NASA in collaboration with the United States Air Force at Western Test Range, Vandenberg Air Force Base, California.

TABLE CCXXXIII - ESRO IB TRUST FUND EXPENDITURES
FY 1970

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
-01 HARDWARE			
60.400.621	NAS1-5610-2	Motors	$ 1,142.98
60.400.443	NAS1-5610-2	Motors	412,642.69
60.400.621	NAS1-5610-2	Procurement of One Scout Vehicle	406,001.33
60.400.911	NAS1-7256-5-H	Mod. D-Section	9,259.41
60.400.939	NAS1-7256-18(M6)-H	Instrument E-Section	6,782.00
60.900.015	NAS1-7256-18(M9)-H	Ignition Mods.	1,150.00
60.900.020	NAS1-7256-18(M12)-T	Heat Shield Mods	612.00
60.400.790	NAS1-7256-18-J	Vehicle Processing	150,050.90
60.400.790	NAS1-7256-18-T	Processing Hardware	30,781.00
60.400.790	NAS1-7256-18-V	Tooling	28,229.00
60.900.076	NAS1-7256-22-V	Vehicle Casting Patterns	2,779.00
60.900.139	NAS1-7256-26-V	Tooling	118.00
60.400.881	NAS1-7256-H	Support to Processing	12,665.10
60.400.881	NAS1-7256-M	Spares	45,843.73
		HARDWARE SUBTOTAL	$1,108,057.14
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
60.400.790	NAS1-7256-5-A	Program Management	$ 139,308.49
60.400.790	NAS1-7256-5-B	Payload Coordination	10,333.00
60.400.790	NAS1-7256-5-N	VAFB Launch Services	9,261.00
60.400.790	NAS1-7256-5-P	Langley Support	26,351.00
60.900.046	NAS1-7256-18(M17)-F	Quality Rep. at UTC	1,655.00
60.400.790	NAS1-7256-18-A	Program Management	30,253.51
60.400.790	NAS1-7256-18-B	Payload Coordination	13,490.00
60.400.790	NAS1-7256-18-C	Preflight Planning	21,032.00
60.400.790	NAS1-7256-18-D	Mission Analysis	40,944.29
60.400.790	NAS1-7256-18-E	Systems Engineering	144,302.00
60.400.790	NAS1-7256-18-F	Reliability Program	98,732.00
60.400.790	NAS1-7256-18-G	Standardization	48,627.00
60.400.790	NAS1-7256-18-L	Logistics Support	33,161.00
60.400.790	NAS1-7256-18-W	Certification Train	2,118.00
60.900.055	NAS1-7256-21-N	VAFB Launch Services	37,906.00
60.900.143	NAS1-7256-29-N	Tech. at WTR, Sept.-Oct. 1970	1,252.00
60.900.088	NAS1-7256-30(M24)-G	Rev. Vol. III Manual	2,185.00
		PRODUCTION SUPPORT SUBTOTAL	$ 660,911.29

TABLE CCXXXIII Concluded - ESRO IB TRUST FUND EXPENDITURES
FY 1970

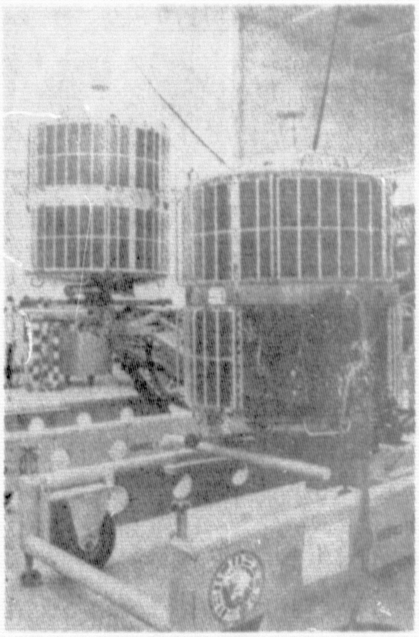
P.R. NO.	ORDER NO.	ITEM	OBLIGATION
LAUNCH-ASSOCIATED SERVICES			
Suballotment GSFC			$ 6,287.30
Suballotment KSC			17,812.59
		LAUNCH ASSOCIATED SERVICES SUBTOTAL	$ 24,099.89
ADMINISTRATIVE			
		Travel & Program Management	$ 68,660.80
		ADMINISTRATIVE SUBTOTAL	$ 68,660.80
		SUPPORTING ACTIVITIES SUBTOTAL	$ 753,671.98
		FY 1970 ESRO IB TRUST FUND TOTAL	$1,861,729.12

ESRO IB TRUST FUND ACCRUED COST
FY 1971

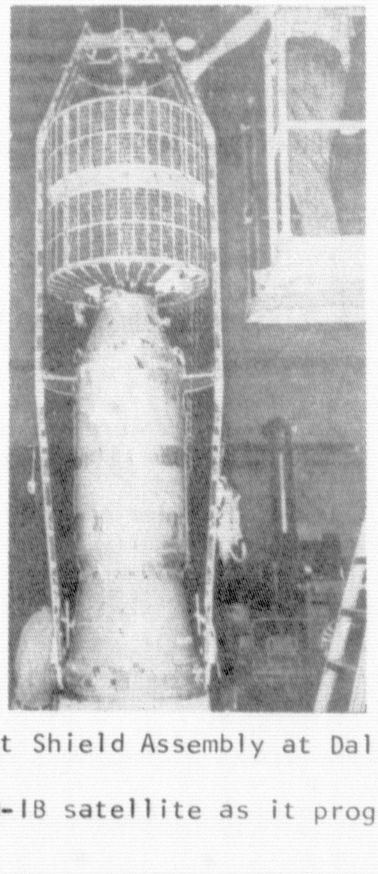
P.R. NO.	ORDER NO.	ITEM	OBLIGATION
-02 SUPPORTING ACTIVITIES			
PRODUCTION SUPPORT (02-02)			
66.000.083	L-67506	WTR Range Supt. for ESRO IB Scout	$ 347,571.87
60.400.790	NAS1-7256-5-D	Data Reduction and Analysis	2,428.13
		PRODUCTION SUPPORT SUBTOTAL	$ 350,000.00
		SUPPORTING ACTIVITIES SUBTOTAL	$ 350,000.00
		FY 1971 ESRO IB TRUST FUND TOTAL	$ 350,000.00

FY 1975 (FINAL FUNDING REQUIREMENTS)

P.R. NO.	ORDER NO.	ITEM	OBLIGATION
IN PROCESS			
60.400.621	NAS1-5610-2	Balance on Procurement of 1 Scout Vehicle	$ 68,486.10
60.400.790	NAS1-7256-18-D	Data Reduction & Analysis Balance	26,080.58
60.400.790	NAS1-7256-X	Training Film	1,977.00
		Travel (Completion of Prorated Share)	12,944.20
		Contract Incentive	106,250.00
		Headquarters Overhead	38,192.00
		Shipping	20,000.00
		DCASO	15,960.00
		BALANCE REQUIRED	$ 289,889.88

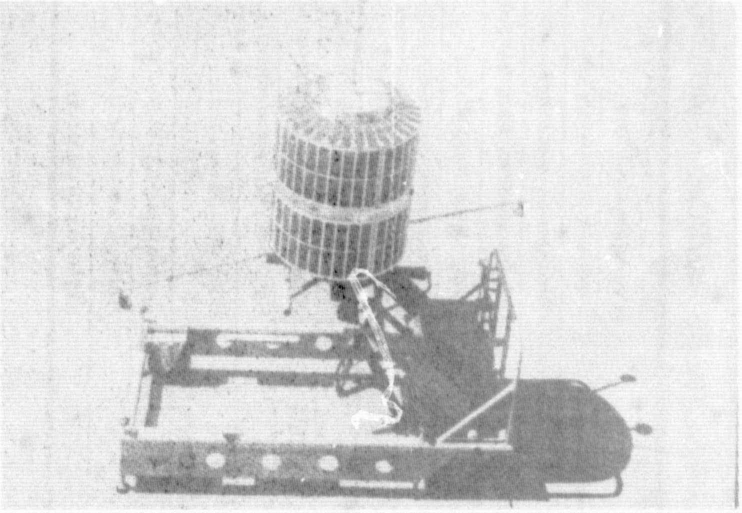


(a) ESRO I Satellite at ESTEC

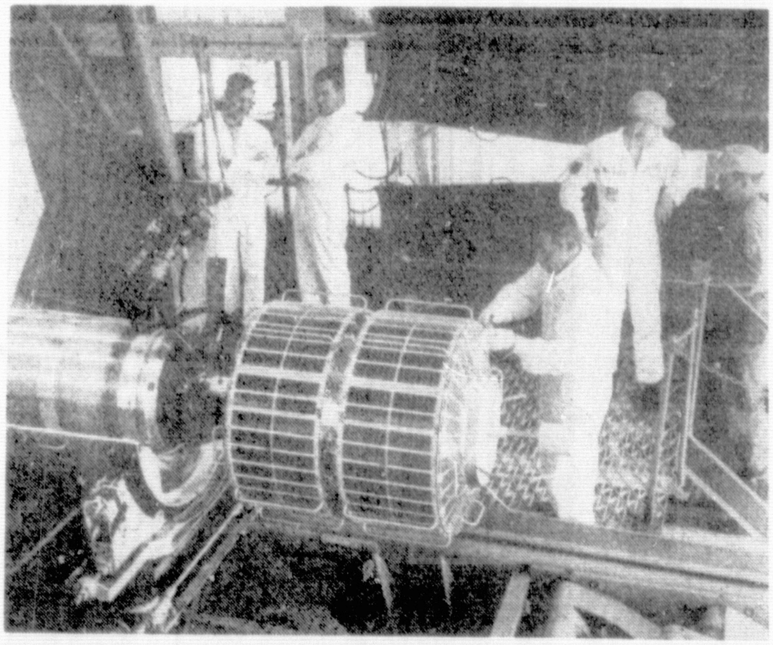


(b) Heat Shield Assembly at Dallas.

Figure 113.- ESRO-IB satellite as it progressed to the launch site.



(c) ESRO-1B in orbital configuration.



(d) Assembly on launch vehicle WTR.

Figure 113 concluded.- ESRO-1B satellite as it progressed to the launch site.

TABLE CCXXXIV - MAIN FIRMS PARTICIPATING IN THE ESRO-I PROJECT.

MAIN FIRMS PARTICIPATING IN THE ESRO I PROJECT / *FIRMES PRINCIPALES PARTICIPANT AU PROJET ESRO I*

• **LABORATOIRE CENTRAL DE TELECOMMUNICATIONS (France)**	Overall project management, housekeeping electrical integration	*Direction d'ensemble, données de bord integration électrique*
• **CONTRAVES A.G. (Switzerland)**	Structure, stabilisation, thermal evaluation	*Structure, stabilisation, évaluation thermique*
• **BELL TELEPHONE MANUFACTURING CO. (Belgium)**	Power supply	*Alimentation électrique*
• **SOCIETE ANONYME DE TELECOMMUNICATIONS (France)**	Solar cells, onboard telemetry encoders	*Cellules solaires, encodeurs de télémetrie*
• **I.E.R. (France)**	Tape recorder	*Enregistreur magnétique*
• **COMPAGNIE FRANÇAISE THOMSON-HOUSTON (France)**	On-board telecommand	*Télécommande de bord*
• **SUD AVIATION (France)**	On board telemetry transmitter	*Emetteurs de télémesure*
• **COMPAGNIE DES COMPTEURS (France)**	Check-out equipment, magnetometer	*Matériel de vérification, magnétomètre*
• **COMPAGNIE DE TELEGRAPHIE SANS FIL (France)**	Antenna coupling network, VHF-filters	*Cicuits de couplage d'antennes, filtres VHF*
• **SAFT (France)**	Pyrotechnic batteries	*Batteries pour pyrotechnique*
• **STANDARD TELEPHONES AND CABLES LIMITES (United Kingdom)**	Antennae	*Antennes*
• **ADCOLE CORPORATION (USA)**	Solar aspect sensor system	*Système de capteurs d'aspect solaire*
• **DYNATRONICS INC. (USA)**	Check-out equipment	*Matériel de vérification*
• **GULTON INDUSTRIES (USA)**	Main batteries	*Batteries principales*

ESRO retained design authority for the spacecraft. A Project Manager nominated by ESTEC assisted by a group of engineers and a Project Scientist is responsible for monitoring, controlling, and coordinating the activities of the prime contractor and associated contractors as well as the scientific groups in order to insure timely, efficient, and economical progress of the project. This was done by establishing a master PERT network of 150 key events which was updated monthly.

Detailed design studies were complete by August 1965. By June 1966 the Structural Model had undergone vibration and thermal tests. Qualification testing on the Prototype began early in 1967 and was complete by March 1968; this unit was then used for compatibility tests in the USA. The two flight unit structures were fabricated early in 1967. Flight acceptance tests began on ESRO-IA in August 1967 and were complete one year later. This unit was launched in October 1968. Similar tests begun on the second flight unit in April 1968 were restricted to balancing, vibration, and a deployment test of boom and yo-yo systems. When the program was restarted in March 1969, this unit - now ESRO-IB - continued acceptance tests until August and then went to Western Test Range for launch.

Scientific group meetings were held every three to four months to review overall progress and solve interface problems. The scientists took part during the integration of their experiments into the spacecraft, during qualification and acceptance testing at ESTEC and during the launch campaigns.

Progress of the project was continuously reviewed by Joint Working Groups, representing ESRO, NASA, and the contractors of both organizations (figure 114).

The first flight unit ESRO-IA (EXPLORER XLI) was successfully launched from Western Test Range on October 3, 1968. Renamed AURORAE, it has behaved very well in orbit.

In March 1969, ESRO decided to launch the second flight unit ESRO-IB on October 1, 1969. The spacecraft was launched into an eliptical orbit having an apogee of 393.0 kilometers and a perigee of 305.0 with 85.13° inclination and a period of 92 minutes. This was the 66th Scout vehicle launch.

The ESRO-1 satellites are designed to study ionospheric and auroral phenomena - particularly over the northern polar regions in darkness in winter (figure 115).

ESRO-IA, renamed AURORAE after its successful launch from Western Test Range, California, on October 3, 1968, initially had inclination of 93.8°, apogee of 1533 kilometers and perigee of 258. The corresponding

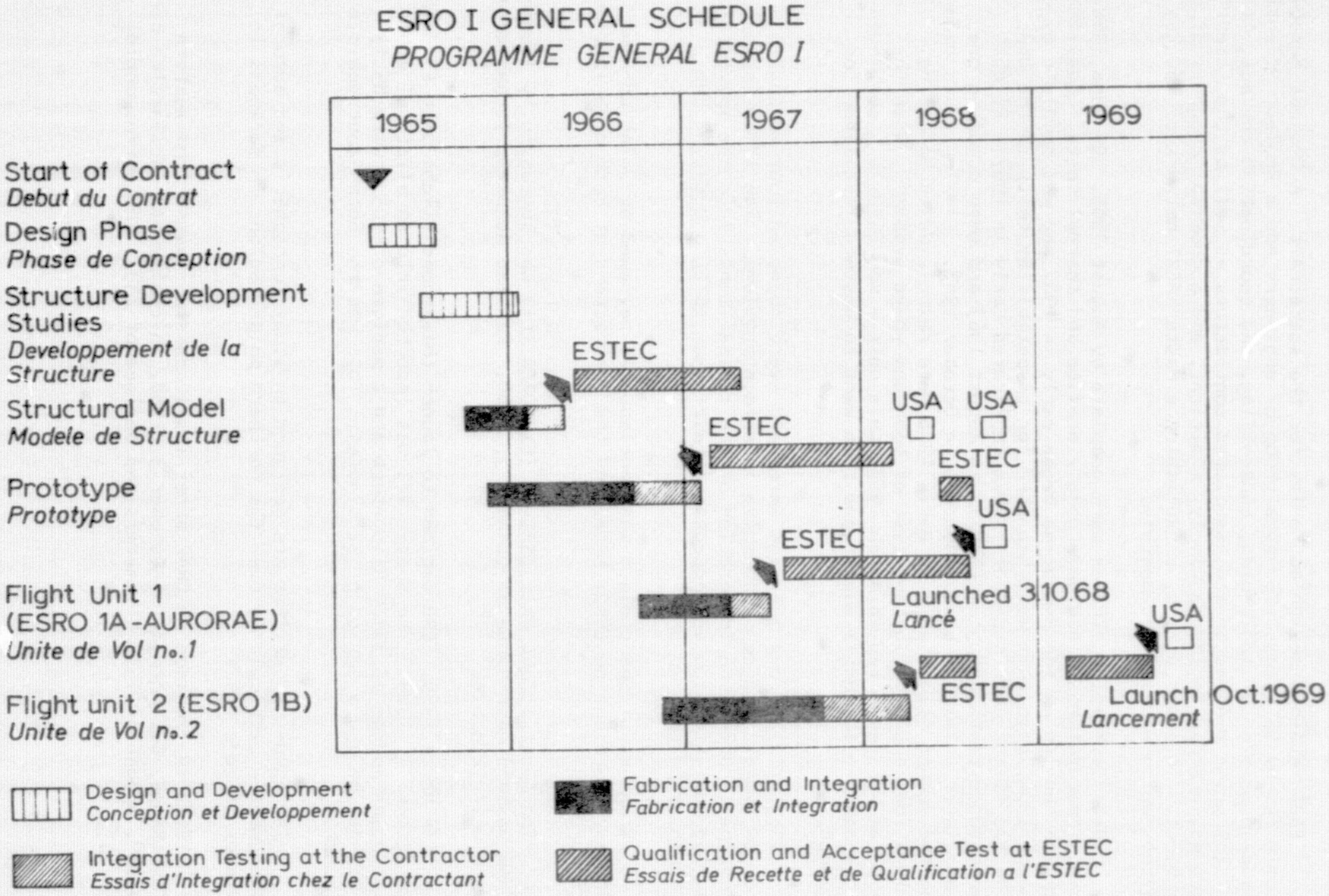


Figure 114.- General schedule of overall progress.

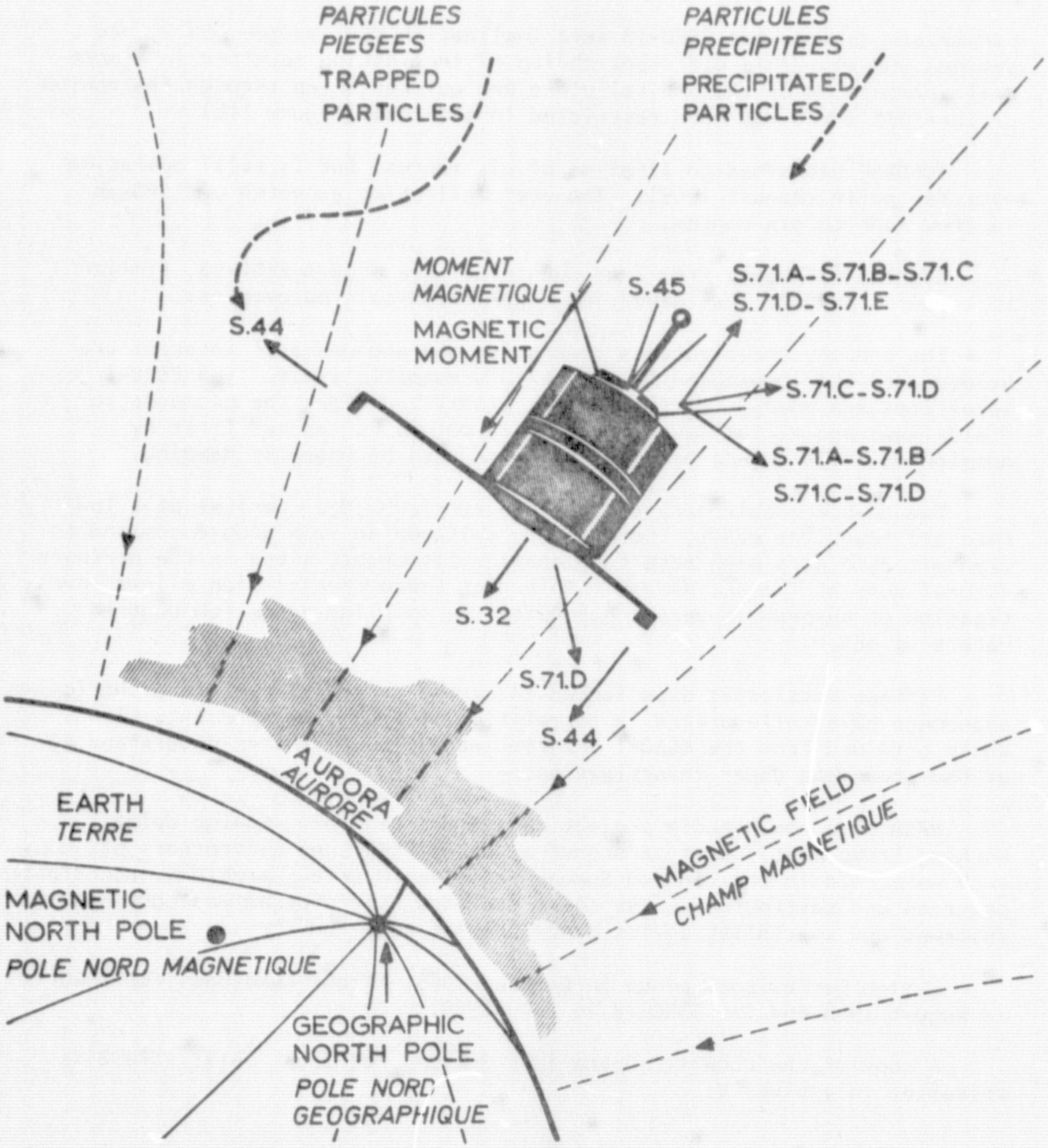


Figure 115.-

ATTITUDE OF SPACECRAFT ABOVE NORTH POLAR REGION

ATTITUDE DU SATELLITE AU DESSUS DE LA REGION POLE NORD

parameters desired for ESRO-IB were inclination 86°, apogee 453 km and perigee 400 km. This different choice of inclination resulted in a more rapid precession of the orbital plane and quicker sweep through the region of interest which was more restricted in altitude (figure 116).

AURORAE had a design lifetime of six months, but is still operating satisfactorily (August 1969). The useful lifetime expected of ESRO-IB is from four to six months.

Eight experiments from four countries were aboard ESRO-IB, similar to those of AURORAE, but embodying minor technical improvements.

The protons and electrons generating the phenomena of interest are guided into the ionosphere by the earth's magnetic field. The ESRO-1 satellites are therefore magnetically stabilized along the geomagnetic field lines and virtually all gyroscopic motion is removed first by despinning after injection into orbit and then by magnetic damping.

Two on-board telemetry systems are carried. One operates at a low rate all round the orbit, the other is switched on from ground command to transmit data at a high rate to a station favourably sited in the northern auroral zone at Tromsö, Norway. This high speed transmission allows investigation of aurorae in very great detail by sampling every few hundred meters of orbit.

Fifteen institutes experienced in ground observation of ionospheric phenomena have collaborated in correlation of ground measurements with those obtained from the ESRO-1 program leading to a greater understanding of the phenomena under investigation.

NASA also nominated a project management team and regular Joint Working Group meetings of personnel of NASA, ESRO, and contractors of both were held in the USA and Europe to solve interface problems, coordinate progress and testing work. At these meetings, the program was continually reviewed and specialist advice drawn upon as required.

Design Review took place in October 1966, Flight Readiness for ESRO-IA in August 1968 and for ESRO-IB in July 1969.

A copy of the ULOW-117 Operations Summary for Scout S-172/ESROIB is presented in exhibit V.

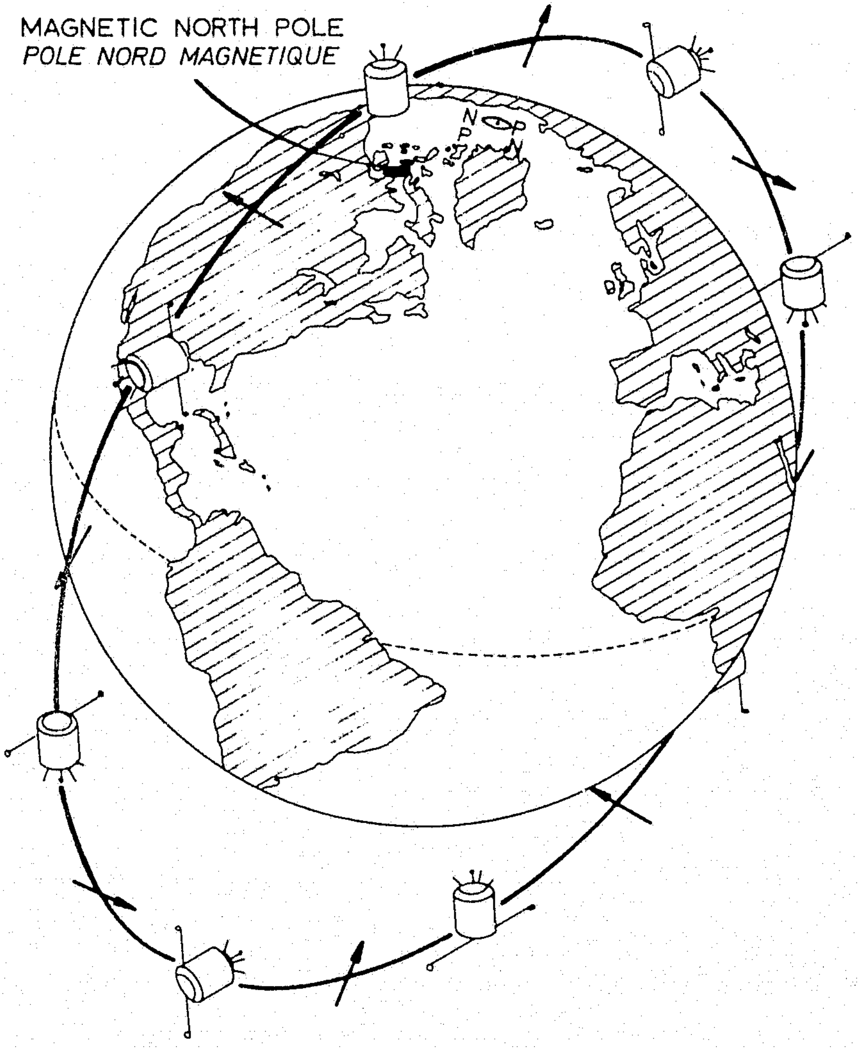


Figure 116.-

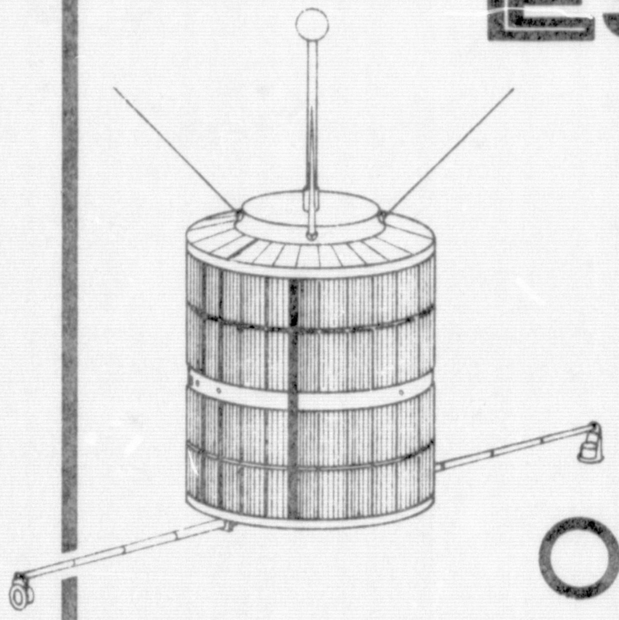
ALIGNMENT OF SPACECRAFT ALONG GEOMAGNETIC FIELD
ALIGNEMENT DU SATELLITE SELON LES LIGNES DE FORCE DU CHAMP MAGNETIQUE TERRESTRE

EXHIBIT V

ULOW 117

ESRO 1B

SCOUT 172



OPERATIONS SUMMARY

1 OCTOBER 1969

GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
KENNEDY SPACE CENTER, NASA, LOMPOC, CALIF.
LANGLEY RESEARCH CENTER, HAMPTON, VA.

ESRO IB

OPERATIONS SUMMARY

FOREWORD

The ESRO program is a joint space research effort between the European Space Research Organization (ESRO) and the United States National Aeronautics and Space Administration (NASA). This Operations Summary has been prepared to provide the Mission Director, Experimenters, Program personnel, and Official observers with a launch operations support summary and a description of the Mission Director Center operations.

ESRO IB

OPERATIONS SUMMARY

1 MISSION

1.1 Mission Objectives

The objective of the Polar Ionosphere Satellite ESRO IB Mission is to measure the energy spectra and angular distribution of high latitude particles and the effects of the particles as manifested by auroral events and by the composition of the ionosphere. Refer to figure 1 for location of experiments.

1.2 Mission Description

The ESRO IB spacecraft will be launched from Space Launch Complex-5 (SLC-5), Western Test Range (WTR), Vandenberg Air Force Base (VAFB), California, 1 October 1969, by a NASA/DOD Scout Launch Vehicle on a 177.216-degree true azimuth. ESRO IB will be placed in a near circular polar orbit to obtain a distribution of measurements with altitude. The planned orbital characteristics of ESRO IB are: apogee 234.45 nautical miles; perigee 215.99 nautical miles; with a 92.74-minute orbital period, and an 86-degree inclination to the equator.

1.3 Launch Vehicle Description

The NASA/DOD Scout Vehicle 172 is a four-stage solid-propellant rocket powered vehicle (figure 2). The launch vehicle is 72 feet high, has a maximum diameter of 40 inches, and weighs over 19 tons at lift-off. An Aerojet General Algol IIB first-stage motor has an average thrust of 101,000 pounds. The Castor II second-stage motor (TX 354-3), manufactured by Thiokol, has a thrust of 61,000 pounds. The Allegany Ballistics Laboratory third-stage motor, an Antares II (X259-A3), has a thrust of 21,000 pounds. The FW-4S fourth-stage rocket motor (XSR-57-UT), manufactured by United Technology Corporation, has a thrust of 5,900 pounds.

1.4 Spacecraft Description

The spacecraft is cylindrical and has flat-angle truncated cones at each end. The spacecraft weighs 176.3 pounds. The cylindrical shell has an outside diameter of 30 inches. The tip-to-tip measurement of the S-44 booms when extended is 95.59 inches and is 60.24 inches high when the S-45 sensor boom is extended. The equator ring, which is part of the internal structure, divides the spacecraft into equal parts. The two cylindrical shell-halves and the adjacent cones are covered with solar cells. The top cone, called experiment cone, houses most of the experiment sensor windows and the four antennas. The two S-32 photometer windows are in the base of the spacecraft. The sensor sphere of experiment S-45 is placed on a boom on top of the experimental cone in

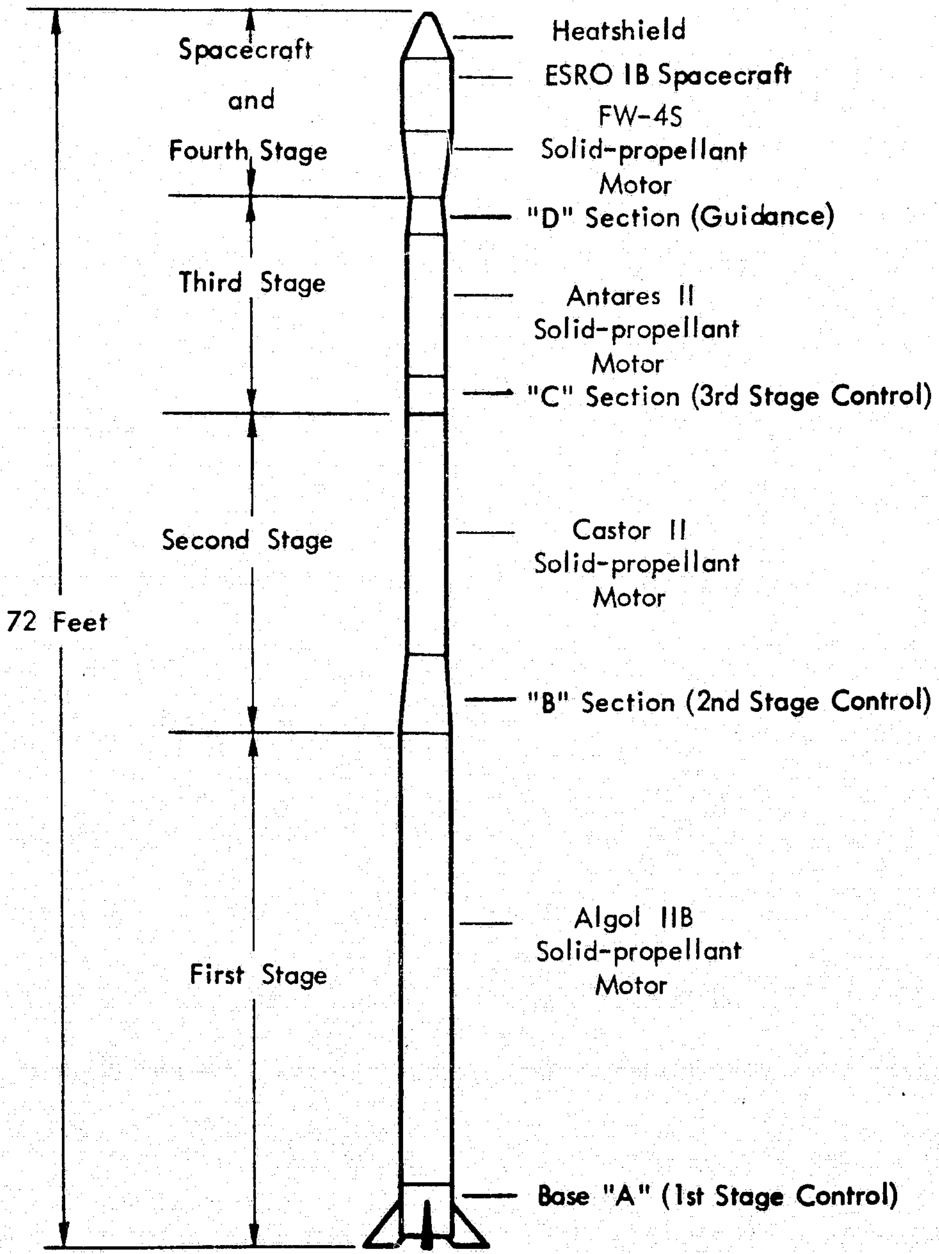


Figure 117.- Scout launch vehicle.

the direction of the reference axis; the two sensors of S-44, measuring electron temperature and electron density are fixed on booms perpendicular to the reference axis at the base of the spacecraft. The main structure component and the center cone are the basic units to which all other structural components are fixed, and into which all static and dynamic loads are transferred. Four vertical honeycomb sandwich plates fixed between the center cone and the equator ring carry the experiment sensors and all electronic equipment. The structure system, consisting of the center cone, instrument boards, and equator ring, allows attachment of the solar cell panels in such a manner that prevents them from absorbing or transmitting stresses or moments.

1.5 Expected Sequence of Events

The major launch events and expected time of occurance are listed in table 1.

Step	Events	Time (T+sec)
1	Lift-off (First-stage Ignition)	0.00
2	Start Timer	0.12
3	First-stage Burnout	76.57
4	Second-stage Ignition/First-stage Separation	77.64
5	Second-stage Burnout	117.11
6	Payload Heatshield Separation	175.41
7	Second-stage Separation/Third-stage Ignition	177.11
8	Third-stage Burnout	213.01
9	Activate "C" Coast Controls	218.01
10	Spin-motor Ignition	434.11
11	Spinup	434.11
12	Explosive Bolt Ignition/Third-stage Separation	435.61
13	Retro	436.61
14	Fourth-stage Ignition	440.11
15	Fourth-stage Burnout	474.35
16	Spacecraft Separation	774.35
17	S-44 Boom Deploy	776.36
18	Yo-Yo Release	780.36
19	S-45 Boom Deploy	782.36

TABLE CCXXXV - MAJOR LAUNCH EVENTS - ESRO-IB.

2 LAUNCH CONSTRAINTS

2.1 Launch Window

The launch window opens at 2229 Z (1529 PDT) and closes at 2259 Z (1559 PDT).

2.2 Vehicle

The launch vehicle parameters shall be monitored during launch countdown to verify that vehicle systems are within allowable limits.

2.3 Spacecraft

During launch countdown, the spacecraft telemetry shall be monitored to verify that all systems are within allowable limits.

2.4 Range Tracking and Data

Prior to launch, it is necessary to receive verification that each of the following items required for Range Tracking and data is operating satisfactorily.

- Beacon Radar (SVAFB)
- 7044 Computer
- NASA Telemetry and Doppler
- Range Telemetry Station
- Communications necessary to support launch
- Spacecraft Telemetry aboard Range Ship

2.5 Range Safety

Two primary tracking systems shall be operational for the launch. The launch corridor shall be clear of trains, ships, and other activities before final launch approval shall be granted.

3 SUPPORT SYSTEM COVERAGE

3.1 Telemetry Support

Telemetry recording (figure 3) of the launch vehicle is expected from lift-off through loss of signal (LOS). Spacecraft telemetry will continue operating throughout the launch phase. The NASA Telemetry Ground Station will provide telemetry data and Doppler tracking during launch to T+550 seconds.

3.2 Optical Coverage

Cinetheodolites and engineering sequential cameras will obtain optical coverage from lift-off through loss of vision - weahter permitting.

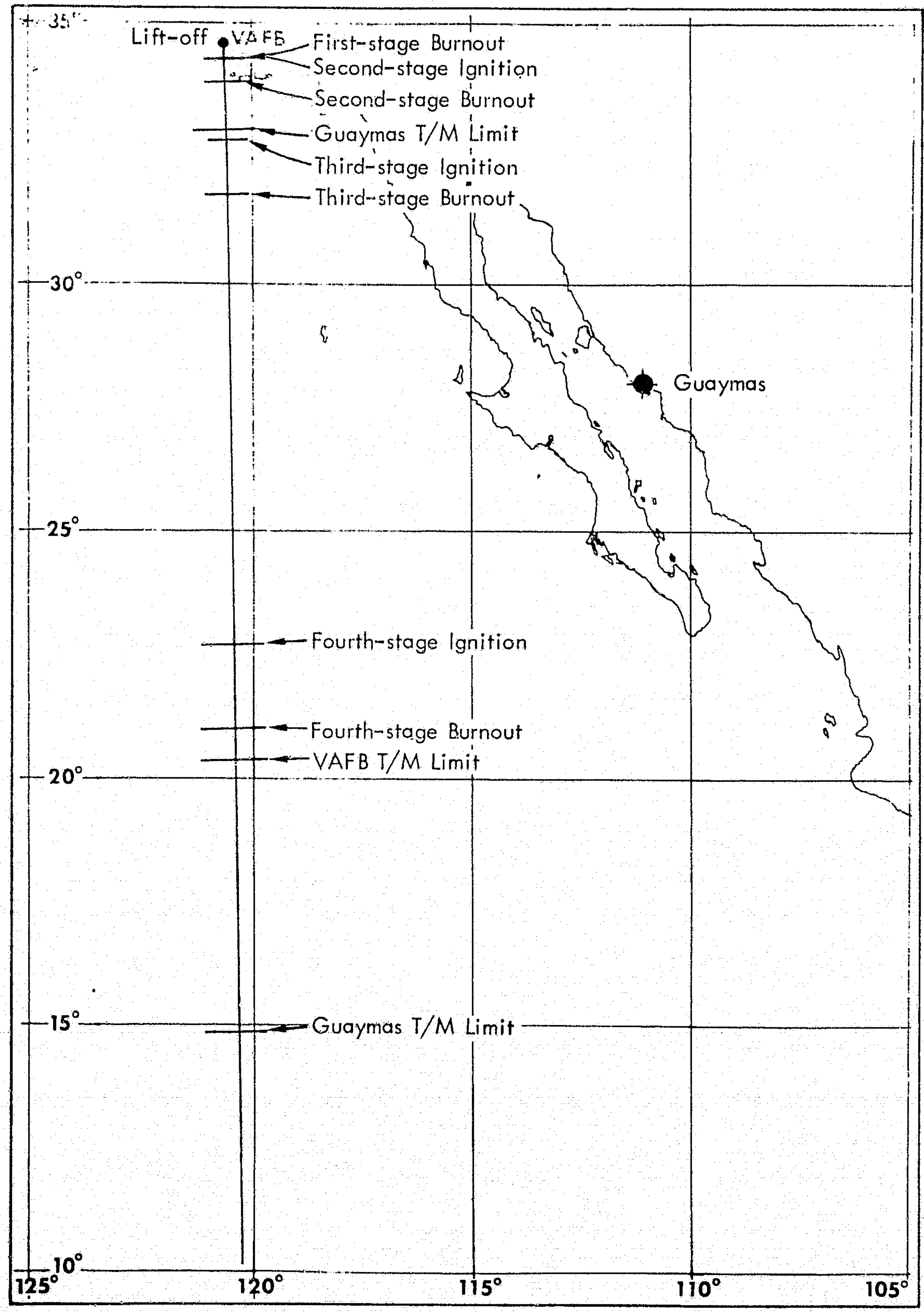


Figure 118.- Downrange telemetry coverage for ESRO-IB.

3.3 Other Communications

The ESTRAC tracking and Data Acquisition Network and the CNES stations will provide tracking and data acquisition in conjunction with NASA STADAN network.

4 MISSION DIRECTOR CENTER OPERATIONS

4.1 General

The Mission Director Center (MDC), B209, and Observation Room, B207, (figure 4) are located on the second floor of Building 840 (figure 5), SVAFB. The Observation Room, separated from the MDC by a glass partition, has 31 seats. A Missile Operations Phone System (MOPS) receiver (8 channels) is available in the Observation Room for monitoring the launch vehicle and spacecraft checks.

4.2 Mission Director Center Displays

4.2.1 Displays

The following displays are located in the MDC:

- Plotting Boards
- Range Readiness Boards
- Vehicle Events Board
- Television
- MDC Clocks
- Countdown Chart

4.2.2 Plotting Boards

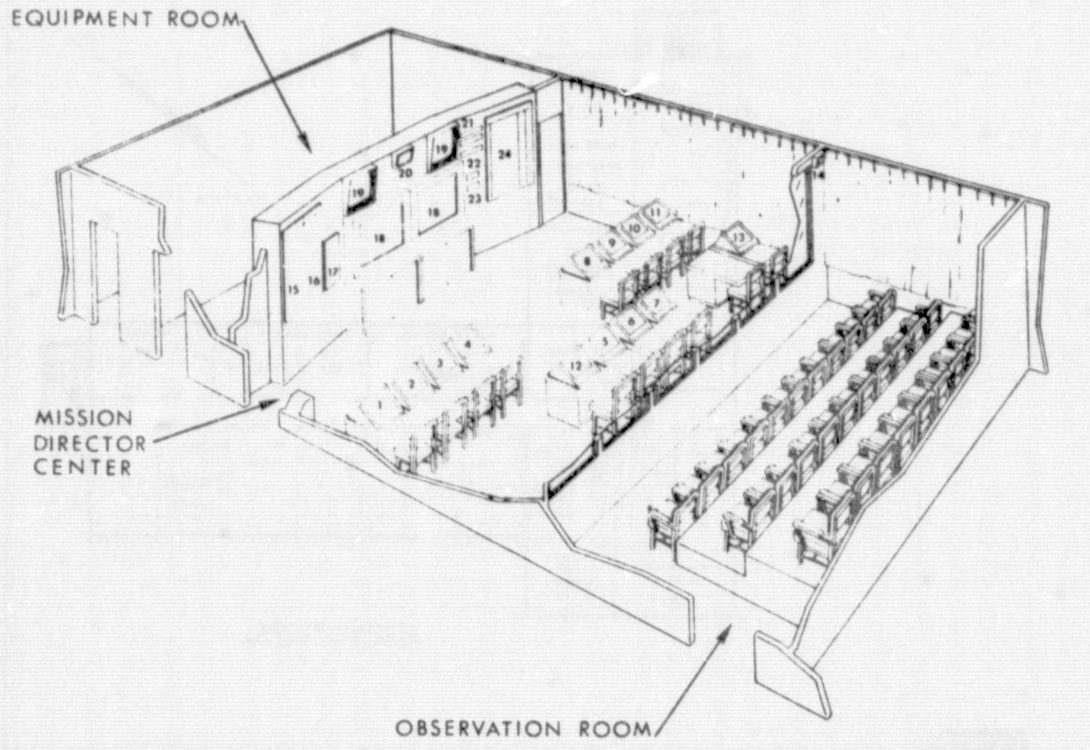
There are two plotting boards, each capable of receiving two sets of X-Y information simultaneously and making continuous plots on a 29-inch chart. Information for plotting board number one and the impact prediction data for board number two (table 2) is received from the 7044 computer in Range Operations, Building 38, SVAFB. Radial velocity versus time is received from the NASA Spacecraft Laboratory, Building 836, SVAFB.

Board No. 1	Board No. 2
Present position information:	Vehicle and spacecraft velocity information:
Downrange vs altitude	Vehicle velocity
Downrange vs crossrange	Radial velocity vs time (Doppler shift data)

TABLE CCXXXVI - AFTER LIFT-OFF PLOTTING BOARD INFORMATION.

4.2.3 Range Readiness Board

The Range Readiness Boards display major tracking and Range instrumentation; key mission personnel and their location during launch, and the posting of train schedules. The Display Control Console operator controls the green or red lights, that indicate the GO/NO GO status.



1. HQ Scout Program Manager
2. Scout Project Manager
3. Scout Vehicle Coordinator
4. ESRO IB Project Scientist
5. ESRO IB Project Manager
6. Mission Director
7. KSC Mission Coordinator
8. GSFC Project Representative
9. HQ S/C Program Manager
10. MDC Controller
11. Sierra Net Controller
12. ESOC Liaison Officer
13. PIO Station
14. MOPS Speaker
15. Personnel Board
16. Range Readiness Board
17. Countdown Display
18. Plotting Boards
19. TV Monitors
20. Range Talker Speaker
21. Countdown Indicator
22. Local Time Indicator
23. Greenwich Mean Time Indicator
24. Vehicle Events Board

Figure 119.- Mission Director Center and Ovservation Room-ESRO.

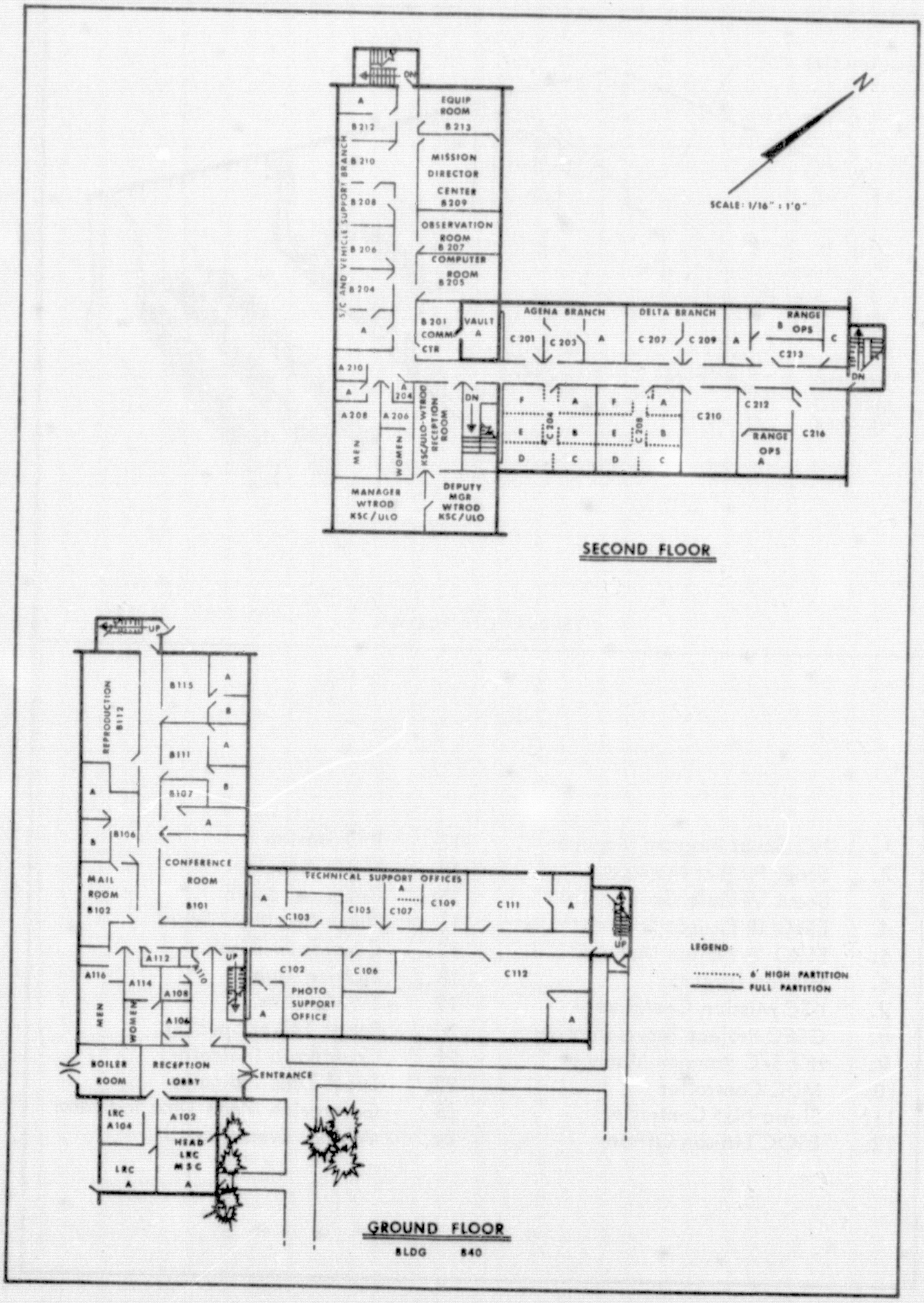


Figure 120.- Engineering and Operations, Building 840 WTR.

4.2.4 Vehicle Events Board

The Vehicle Events Board lists vehicle and spacecraft events with expected time of occurrence. A column for actual time of occurrence is provided. The Display Control Console operator controls the green and red lights that indicate event occurrence or non-occurrence. Inputs to the Console operator are provided by observers at the NASA and Range Telemetry Stations.

4.2.5 Television

The two television monitors provide inside shelter pictures until removal. A pad surveillance picture will be transmitted until lift-off.

4.2.6 Time and Time Counting Clocks

Two countdown clocks indicate the count status during the launch operation. The upper clock is controlled from the blockhouse, while the lower is controlled from the NASA Telemetry Station. There are two clocks synchronized to WWV, one showing Greenwich Mean Time and one Local Time.

4.2.7 Countdown Display Chart

A chart is posted for each launch, displaying the task by title and number, and the time (T minus minutes) of each performance.

4.3 Voice Communications

The five types of voice communications connected to the various consoles used in the Mission Director Center are:

- Missile Operations Phone System (MOPS)
- Administrative Direct Lines (ADL)
- Voice Direct Line (VDL)
- Switching, Conferencing, and Monitoring Agreement (SCAMA)
- Red Ball

4.4 Console Operation

Thirteen consoles are located in the MDC. Each console is individually programmed for the mission. Each console contains controls for VDL, ADL, Red Ball, SCAMA, MOPS, and a monitor speaker (table 3). For complete instructions on the operations of MDC communications control panels, refer to the Appendix of this Operations Summary.

Console Number	Console Operator	Voice Direct Lines
1	HQ SCOUT PROGRAM MANAGER P. GOOZH	
2	SCOUT PROJECT MANAGER R. ENGLISH	NTD
3	SCOUT VEHICLE COORDINATOR J. GOWDEY	NTD
4	ESRO IB PROJECT SCIENTIST R. JAESCHKE	
12	ESOC LIAISON OFFICER C. KALWEIT	
5	ESRO IB PROJECT MANAGER M. GRENSEMANN	
6	MISSION DIRECTOR P. BLASSEL	NTD
7	KSC MISSION COORDINATOR C. FUENTES	RCO No. 3 NTD
8	GSFC PROJECT REPRESENTATIVE H. EAKER	
9	HQ S/C PROGRAM MANAGER	LOCC
10	MDC CONTROLLER G. LANGENFELD	
11	SIERRA NET CONTROL R. DRAKE/D. ROSE	
13	PUBLIC INFORMATION OFFICER J. LAGARDERE	

Note: All consoles have eight MOPS capability

LEGEND

LOCC = Launch Operations Control Center
NTD = NASA Test Director
RCO No. 3 = Range Control Officer

TABLE CCXXXVII - MISSION DIRECTOR CENTER CONSOLE COMMUNICATIONS WESTERN TEST RANGE.

5 LAUNCH OPERATIONS

5.1 Launch Countdown R-0 Day

The launch countdown will begin at 0924 PDT on launch day. There are manual overrides and technical holds built into the system that may be used if any system malfunctions or if the countdown is ahead of schedule.

The Countdown Schedule (table 4) presents the integrated countdown from initiation through Terminal Count, giving the time for each task. Terminal Countdown takes 30 minutes to complete.

5.2 NASA/WTROD Telemetry Support

The NASA/KSC/WTROD Telemetry Station, located in Building 836 (figure 6) provides vehicle telemetry recording, spacecraft telemetry support, and spacecraft Doppler measurement.

Launch vehicle systems engineers are provided data during Countdown Tests and from lift-off through LOS. The Scout launch vehicle carries one telemetry link on the third stage, which is received and processed, for realtime display. Also, this vehicle carries a fourth-stage (E-section) telemetry system for the purpose of verifying fourth-stage performance.

Spacecraft telemetry data is provided to the ESRO IB Ground Station in the form of raw RF and, as a backup, video from the WTROD Telemetry Station. Additional high speed and low speed data backup during prelaunch testing is available via a direct wire connection with ESRO IB equipment in the Blockhouse. Flight data will be available from lift-off through LOS after fourth-stage burnout.

Doppler (frequency shift due to relative velocity) measurements will be made continuously during launch using the spacecraft received signal. This Doppler data will be plotted in realtime in the Mission Director Center to enable an instantaneous evaluation of vehicle performance. Doppler data will also be transmitted to GSFC in realtime for plotting in the Operations Control Center.

Antenna systems used for vehicle and spacecraft support include; fixed antennas on the 450-foot tower, alongside the spacecraft laboratory; tracking systems on the laboratory roof; and the 28-foot parabolic tracking antenna located on Santa Ynez Ridge; approximately one-half mile south of the laboratory. During prelaunch tests telemetry signals from the Scout launch complex, located at the mouth of Honda Conyon, cannot be received directly. An RF repeater system on Honda Ridge must be used to relay (or retransmit) the signals.

Time		Event	Sect.	Task
PDT	(T-Min)		S/C	Veh
0924	365	Communication Check		0
0924	365	Start Countdown	3	
0925	364	Communication Check	4	
0929	360	Launch Complex & Vehicle System Activation		1
0931	358	Final Spacecraft Preparation	6	
0947	342	Spacecraft On & Check	7	
0955	334	Setup Command Levels	8	
1002	327	Preerection Check of Power Supply	9	
1004	325	Electronic Systems Checkout		2
1020	309	Preerection Check of Telemetry	10	
1050	279	Preerection Check of Experiments	12	
1100	269	Preerection Check of Attitude Measuring Systems	11	
1109	260	Data Analysis	3	
1120	249	Spacecraft Status Reporting & Directive	3	
1122	247	Spacecraft Mode During Erection	13	
1124	245	Reaction Control System Fueling		3
1127	242	Spacecraft Monitoring During Erection	14	
1239	170	Vehicle Erection		4
1311	138	Setup Command Levels	8	
1318	131	Post Erection Check of Telemetry	15	
1324	125	Final Systems Checkout		5
1340	109	Post Erection Check of Experiments	12	
1351	98	Data Analysis		
1410	79	Spacecraft Status Reporting & Directive	3	
1412	77	Spacecraft Mode for Launch	17	
1414	75	Countdown Evaluation		6
1417	72	Spacecraft Monitoring During Terminal Countdown & Launch	18	
1454	35	State Spacecraft is GO Condition		
1459	30	Terminal Countdown		7
1459	30	Start of Terminal Countdown		
1514	15	Switch Spacecraft to Internal Power	3	
1527	2	Pull Spacecraft Umbilical		
1529	0	Lift-off		

TABLE CCXXXVIII - COUNTDOWN SCHEDULE - ESRO-1B.

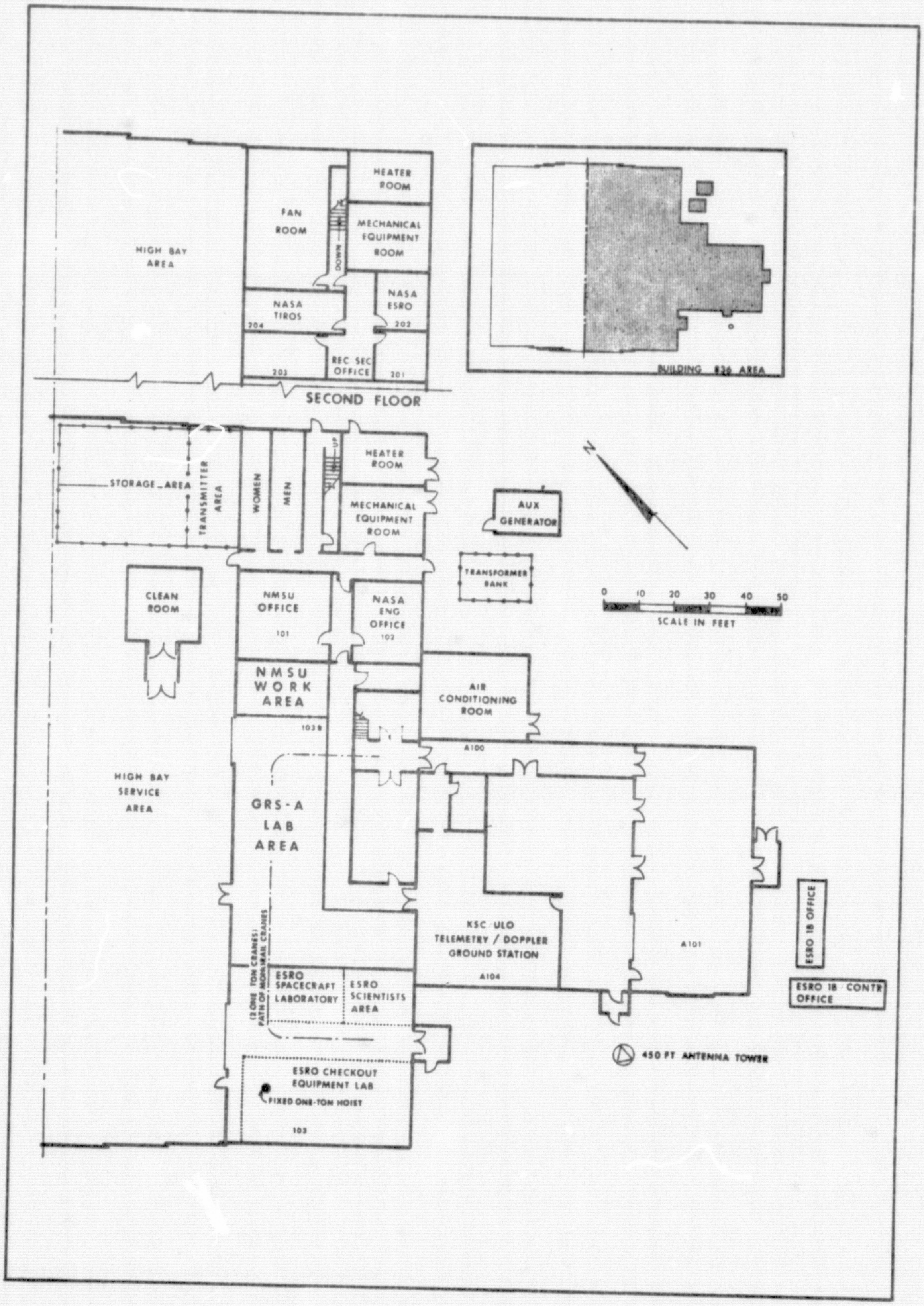


Figure 121.- Spacecraft Laboratory and Telemetry Station, Building 836 WTR.

ATTACHMENT TO APPENDIX G

OPERATIONS SUMMARY

A-1 INTRODUCTION

The following detailed instructions for the operation of the five types of voice communications in use at the NASA/WTR Mission Director Center (MDC) have been prepared to assist the console user. The MDC is equipped with thirteen consoles, with a typical one (shown in figure A-1) containing eight MOPS channels; eight ADL lines; four VDL lines; a SCAMA network; and Red Ball telephone system. A monitor speaker, associated electrical plug-in modules, and push buttons are contained in each console panel.

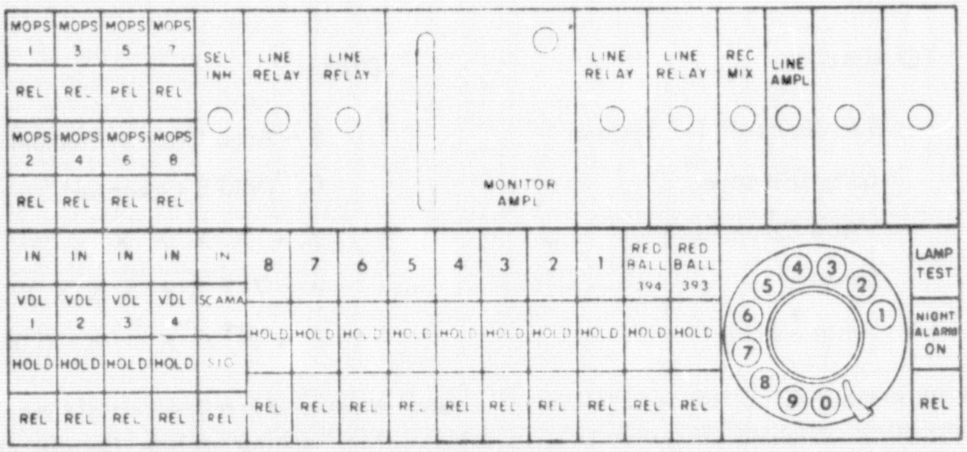


Figure 122.- Typical MDC console panel.

A-2 MISSILE OPERATIONS PHONE SYSTEM (MOPS)

To transmit on a selected channel:

1. Press the proper MOPS 1 through MOPS 8 button, which will become brightly illuminated when the circuit is activated.
2. Push the PRESS-TO-TALK button on the headset extension cord. This button, when in a closed position, prevents background noise on the network.

The remaining seven circuits will have monitoring capability only, and if activated, will be dimly illuminated. A monitoring circuit can be converted to transmit, and vice versa. To change select cirucits:

1. Release the circuit in use by pressing the REL button directly under it.
2. Press the MOPS button for the channel desired for transmitting.
3. Press the MOPS button for the original channel to place it in a monitor status.

A-3 ADMINISTRATIVE DIRECT LINES (ADL)

To select an outside line, press one of the eight numerical buttons not illuminated, then dial as follows:

TO REACH:	DIAL:
FTS (Federal Tel System)	8 - Area Code - Number
Long Distance	0 (VAFB Operator)
VAFB Extension	X - X X X X
Lompoc	9 - 7 3 X - X X X X
Santa Maria	7 - X X X - X X X X

A flashing numerical button on a telephone control module alerts the console monitor to an incoming call, which is answered by pressing the flashing button, thereby converting the circuit to a conventional telephone.

To hold a line in use so another call may be answered, and then return to the first conversation, press:

1. The HOLD button of the line in use.
2. The button for the incoming call, which completes that circuit.
3. The REL button to release the circuit upon completion of the second call.
4. The illuminated HOLD button to resume the first call.

A-4 VOICE DIRECT LINES (VDL)

To reach a party on the other end of the line, press the appropriate VDL button. To answer an incoming call, press the flashing IN button, which opens the line for voice communication. To hold a call while answering another line:

1. Press the HOLD button of the line in use.
2. Press the button for the incoming call, and upon completion, press the REL button, clearing the line.
3. Press the VDL button of the call being held to release the HOLD and and permit continuation of the conversation.

A-5 SWITCHING CONFERENCING AND MONITORING ARRANGEMENT (SCAMA)

The SCAMA network serves as a voice communication system between GSFC, Greenbelt, Maryland, and 51 communication points in the NASA Space Tracking and Data Acquisition Network (STADAN), including KSC/ULO/WTR. To use the network:

1. Press the appropriate button labeled SCAMA, then press the signal button.
2. When Goddard Voice Control answers, identify yourself as "WTR Launch Area", and request Goddard Voice Control to connect you with the desired station.
3. An incoming SCAMA call will illuminate the IN button. Answer by pressing the SCAMA button.
4. Upon completion of conversation, press the REL button.

A-6 RED BALL TELEPHONE LINES

The Red Ball system is for use during a missile launch operation. To select a Red Ball line, press either of the two Red Ball unilluminated buttons, and a dial tone will be heard in the headset. An incoming call activates a flashing light to alert the monitor. Pressing the flashing button permits the circuit to be used as a conventional telephone. Press the HOLD button of the line in use to answer another call, and upon conclusion of the call, release it by pressing the REL button. To reach a Red Ball number within VAFB, dial only the last three digits.

APPENDIX H

BIBLIOGRAPHY

APPENDIX H

BIBLIOGRAPHY

REPORT NUMBER (If available)	
W-1115.2.20	WTR, UK-4 Satellite Program Requirements Document Supplement to the Scout PRD 6500, 1965.
0004	LTV, Hydrogen Peroxide Stability Index and Pressure Rise Relationship Study, April 30, 1965.
AFWTR-OD-9200, OD-9210	Operations Directive Scout Vehicle Programs, December 1, 1965.
CR-359	LTV, Test and Documentation of the MARC 36A1, 1 KS-75 Spin Motor For the Scout Vehicles, NAS1-3899, Task Order 18, January 1966
CR 66596	LTV, Scout Error Analysis Phase 1 Final Report 07919-6001-R000, January 1966
23.255	LTV, Scout Second Stage Roll Transient Anomaly Investigation, NAS1-4664, January 1966
321.24	LTV, San Marco Program Trajectory Analysis, Contract NAS1-3899, January 5, 1966.
23.163	LTV, Rocket Motors and Pyrotechnics Manual, January 7, 1966.
	LTV, Vehicle 143C Narrative End Item Report, January 7, 1966.
23.253	LTV, Reliability Requirements for Scout Motor Subcontractors, NAS1-4664, January 10, 1966.
3-15000/6R-4	LTV, Scout Payload Coordination Status Report and Program Schedule, N-8, January 14, 1966.
23.254	LTV, NASA Scout Reliability Status Report for Month Ending December 31, 1965, NAS1-4664, January 15, 1966.
6R-1	LTV, Flight Test Plan, SLV-1A Vehicle S-143, AF04(695)-791, January 21, 1966.
6R-678	LTV, San Marco Launcher Static and Functional Tests, January 26, 1966.

REPORT NUMBER (If available)	
TR-PL-8634-00-1	Atlantic Research Corp., Evaluation of the MARC 7G1 Auxiliary Rocket Motor for Use on the Atlas-Centaur Vehicle, February 1966.
321.25	LTV, San Marco Spacecraft Residual Motion Study, Contract NAS1-3899, February 9, 1966.
C-65-41B and 41C	Thiokol Chemical Corp., Design and Development of the Castor IIA Rocket Motor, February 10, 1966.
6R-12	LTV, Feasibility Study of a Scout Central Ordnance Complex, NAS1-3899, Task Order 46, February 11, 1966.
6R-19	LTV, Scout Payload Coordination Status Report and Program Schedule, OV3-5, February 15, 1966.
23.260	LTV, NASA Scout Reliability Status Report for Month Ending January 31, 1966, February 18, 1966.
23.263	LTV, Time Temperature Limits of the Scout Vehicle Solid Rocket Motors, NAS1-4664, February 22, 1966.
3-30000/6R-4	LTV, NASA Scout S-138 Final Flight Report, NAS1-4664, February 23, 1966.
23.262	LTV, Investigation of Scout Guidance System Ratio Shift, Dallas to the Western Test Range, NAS1-4664, February 25, 1966.
ARA 297-1	Allied Research Associates, Inc., Investigation of Stresses in the Algol IIB Rocket Nozzle Model, Final Technical Report, February 25, 1966.
23.265	LTV, Fit and Ejection Test on Scout A-30 Heat Shield and OV3-4 Payload, February 28, 1966.
23.272	LTV, Report of Qualification Test on Solid State Timer, March 1966.
6R-5	LTV, Flight Test Plan SLV-1A Vehicle S-145C, March 1, 1966.
00.766	LTV, Scout Flight Vibration and Shock Environment, NAS1-4664, March 2, 1966.
	LTV, Vehicle S-145C, Narrative End Item Report, March 11, 1966.

REPORT NUMBER (If available)	
00.769	LTV, Computation of Aerodynamic Angles of Attack and Yaw From Radar and Telemetry Data, March 11, 1966.
23.261	LTV, PM1-5 Battery Cell Discharge Test, March 14, 1966.
331.001	LTV, San Marco Program Vehicle Aerodynamic Data and Restrictions, NAS1-3899, March 15, 1966.
6R-7	LTV, NASA Scout S-140C Final Flight Report, March 17, 1966.
331-002	LTV, Preliminary Design and Cost Resources Information for Installation and Integration of a Whittaker G649 Gyro Package into a San Marco Scout Vehicle, NAS1-3899, March 17, 1966.
6R-6	LTV, NASA Scout S-139, Final Flight Report, March 18, 1966.
6R-50	LTV, Motor Procurement and Technical Management of Scout Propulsion Systems, NAS1-4664, March 21, 1966.
6R-49	LTV, San Marco Range Safety Study, NAS1-3899-11, March 21, 1966.
6R-48	LTV, Scout Payload Coordination Status Report and Program Schedule N-9, NAS1-4664, March 21, 1966.
23.266	LTV, Space Environmental Simulator Spin Motor Tests, NAS1-4664, March 22, 1966.
00.773	LTV, Hydrogen Peroxide System Conditioning Instructions for the San Marco Launcher, NAS1-3899-11, March 22, 1966.
23.265	LTV, NASA Scout Reliability Status Report for Month Ending February 28, 1966, NAS1-4664, March 22, 1966.
6R-54	LTV, Scout Payload Coordination Status Report and Program Schedule N-10, NAS1-4664, March 25, 1966.
6R-53	LTV, Scout Payload Coordination Status Report and Program Schedule, OV3-1 (OAR), NAS1-4664, March 25, 1966.
6R-52	LTV, Scout Payload Coordination Status Report and Program Schedule, OV3-3, NAS1-4664, March 25, 1966.
W-1115.2.8	WTR, NASA/DOD Scout V-143C, Flight Evaluation Report, March 25, 1966.

REPORT NUMBER (If available)	
6R-681	LTV, Analysis of Scout Vehicle Vibration Data, S-131, Contract NAS1-4664, March 28, 1966.
23TRA-0026	LTV, Scout Fourth Stage Motor Creep Test, March 30, 1966.
23.271	LTV, "E" Section Multi-Function Payload Separation System Ignition Evaluator Test Report, NAS1-3899, April 1, 1966.
6R-8	LTV, Flight Test Plan SLV-1A Vehicle A-146C, April 1, 1966.
W-1115.2.11	WTR, Research and Development, Range Users Handbook, April 1, 1966.
6R-36	LTV, Scout Payload Coordination Status Report and Program Schedule, ESRO II, NAS1-4664, April 4, 1966.
	LTV, Vehicle S-146C Narrative End Item Report, NAS1-4664, April 11, 1966.
331-003	LTV, San Marco Rocket Motor Overseas Shipment Environment Monitor Study, NAS1-3899, April 11, 1966.
23-TRA-0028	LTV, Metallurgical Evaluation of Payload Adapter Casting, P/N 23-00336-1, Magnesium Alloy AZ91C-T6, April 14, 1966.
23.273	LTV, NASA Scout Reliability Status Report for Month Ending March 31, 1966, April 15, 1966.
W-1115.2.9	WTR, NASA/DOD Scout, V-145C Flight Evaluation Report, April 22, 1966.
6R-75	LTV, Scout Payload Coordination Status Report and Program Schedule, UK-3, April 29, 1966.
23.276	LTV, Structural Load Test Results Evaluation, ABL X-259 Motor Loaded and Unloaded Case, NAS1-3899, April 29, 1966.
23.279	LTV, NASA Scout Reliability Status Report for Month Ending April 30, 1966.
6R-9	LTV, Flight Test Plan for Scout Vehicle 147C, May 1966
6R-76	LTV, NASA Scout Payload Separation System "E" Section Weight Study Phase I, NAS1-4664, May 3, 1966.

REPORT NUMBER (If available)	
6R-10	LTV, Scout S-142C Final Flight Report, NAS1-4664, May 3, 1966.
23-TR-0031	LTV, Compatibility Classification of Selected Teflon and Filled Teflon Tubing With 90 Percent Hydrogen Peroxide, NAS1-4664, May 5, 1966.
23.274	LTV, Quarterly Review of Scout Orbital Performance Capability, Contract NAS1-4664, May 6, 1966.
23.275	LTV, Processing, UK-E Satellite Payload, NAS1-4664, May 11, 1966.
6R-15	LTV, Scout S-141C Final Flight Report, NAS1-4664, May 20, 1966.
	LTV, Vehicle 148C, NAS1-4664, Narrative End Item Report, May 20, 1966.
G-930.13.12	General Electric, General Environmental Test Specification for Spacecraft and Components Using Launch Environments Dictated by Scout FW-4 and Scout X-258 Launch Vehicles, May 20, 1966.
L-955-17.50	Langley Working Paper by H. Scott Wagner, Results of Testing UTC FW-4S Solid Propellant Rocket Motor Nozzle in the UTC TM-3A Test Motor Under the Combined Effects of Motor Chamber Pressure and Rotational Spin at Sea-Level Conditions, May 27, 1966.
23-TR-0033	LTV, Metallurgical Examination of Scout 48-Pound Motor Chamber, May 31, 1966.
23.282	LTV, NASA Scout Reliability Status Report for Month Ending May 31, 1966.
AEDC-TR-66-87	Arnold Engineering and Development Corp., Simulation of the In-Flight Despin Event of the UTC XSR 57-UT-1 Solid-Propellant Rocket Motor S/N 30104, June 1966.
CR-477	LTV, Electrostatic Measurement Experiment, Scout Vehicle S-131R, June 1966.
6R-90	LTV, Scout Payload Coordination Status Report and Program Schedule for AD/IE-C, June 1966.
CR-66515	Lockheed-Missiles Systems Division, TOLIP, Trajectory Optimization and Linearized Pitch Computer Program, NAS1-5106, June 1966.

REPORT NUMBER (If available)	
5R-240	LTV, Configuration Control Operating System for Scout, Revision A, June 1, 1966.
23-TRA-0039	LTV, Examination of Scout Base A Launch Pin Assembly, 331-61620-12, NAS1-4664, June 2, 1966.
6R-87	LTV, Scout Payload Coordination Status Report and Program Schedule, San Marco-B, NAS1-4664, June 6, 1966.
23.275	LTV, Processing UK-E Satellite Payload, Contract NAS1-4664, June 6, 1966.
6R-21	LTV, Flight Test Plan, SLV-1A Vehicle S-149C, June 10, 1966.
6R-22	LTV, Scout S-143C Final Flight Report, NAS1-4664, June 17, 1966.
23.283	LTV, Guidance Compatibility Analysis, NAS1-4664, June 22, 1966.
23.286	LTV, Scout Reliability Status Report for Month Ending June 30, 1966.
23.281	LTV, Qualification Test Plan Scout Improved "D" Section, NAS1-5592, July 1, 1966.
23.289	LTV, Investigation of Scout Vehicle Ignition-Destruct System Circuit Resistance Measurements, NAS1-4664, July 7, 1966.
6R-682	LTV, Analysis of Scout Vehicle Vibration Data S-136, July 7, 1966.
23.287	Scout First Stage Moment Disturbance Study, NAS1-4664, July 15, 1966.
6R-20	LTV, Scout S-145C Final Flight Report, NAS1-4664, July 15, 1966.
6R-110	LTV, Scout Payload Coordination Status Report and Program Schedule, OV3-6, NAS1-4664, July 15, 1966.
6R-109	LTV, Scout Payload Coordination Status Report and Program Schedule, N-11, NAS1-4664, July 15, 1966.
6R-54	LTV, Scout Payload Coordination Status Report and Program Schedule, N-10, Revision B, NAS1-4664, July 15, 1966.
6R-31	LTV, Scout Program Off-Site Range Stock IBM Listing Establishment of Allocations as of July 18, 1966.

REPORT NUMBER (If available)	
6R-32	LTV, Flight Test Plan SLV-1A Vehicle S-150C, July 20, 1966.
23.292	LTV, Final Report Fit and Ejection Test of Scout A-34 Heat Shield and N-9 Payload, NAS1-4664, July 28, 1966.
	LTV, Vehicle 150C Narrative End Item Report, NAS1-4664, July 29, 1966.
23.278	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Hydraulic Control Subsystem, NAS1-4664.
23.268	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Reaction Control Subsystem, NAS1-4664.
23-LRA-0043	LTV, Tensile Test of Hi-Shear All Captive Nut (Modified) S/N 7313-2, August 4, 1966.
23-TRA-0042	LTV, Metallurgical Evaluation of the Scout Fourth Stage Separation Clamp Fitting, 17-4PH Corrosion Resistant Steel Casting, NAS1-5592, August 5, 1966.
6R-35	LTV, Scout S-146C Final Flight Report, NAS1-4664, August 12, 1966.
	LTV, Vehicle S-151C Narrative End Item Report, NAS1-4664, August 15, 1966.
6R-683	LTV, Analysis of Scout Vehicle Vibration Data S-137, NAS1-4664, August 26, 1966.
	LTV, Vehicle 152C Narrative End Item Report, NAS1-4664, August 29, 1966.
6R-36	Monthly Replenishment Requirements Reports, NAS1-4664, LTV, August 31, 1966.
23.295	LTV, NASA Scout Reliability Status Report for Month Engind August 31, 1966.
23.291	LTV, 34-Inch Heat Shield Single Squib Ejection, NAS1-4664, September 1966.
6R-23	LTV, Flight Test Plan, SLV-1A Vehicle S-151C, AF04(695)-791, September 7, 1966.
	LTV, Vehicle 153C Narrative End Item Report, NAS1-4664, September 14, 1966.

REPORT NUMBER (If available)	
W-1115.2.12	WTR, Program Requirements Document, Scout Vehicle (6500), September 15, 1966.
6R-24	LTV, Scout S-147C Final Flight Report, NAS1-4664, September 22, 1966.
23-TRA-0047	LTV, Metallurgical Examination of the Scout Spin Casting Aluminum Alloy, September 30, 1966.
6R-38	LTV, Scout Program Off-Site Range Stock IBM Listing, Establishment of Allocations as of September 30, 1966.
6R-687	LTV, Analysis of Scout Vehicle Vibration Data, S-145, NAS1-4664, October 1966.
6R-686	LTV, Analysis of Scout Vehicle Vibration Data, S-140, NAS1-4664, October 1966.
23.300	LTV, Volume III Field Disposition Criteria, NAS1-4664, October 7, 1966.
U-1105.1.6	United Technology Center, BFK 1544-66-F, Final Report UTC 2228-FR dated 9-12-66, Final Report FW-4S Nozzle Insert Design Analysis, October 12, 1966.
6R-684	LTV, Analysis of Scout Vehicle Vibration Data S-138, NAS1-4664, October 13, 1966.
6R-25	LTV, NASA Scout S-144C Preflight Planning Report, NAS1-5880, October 14, 1966.
6R-26	LTV, Scout S-153 Preflight Planning Report, October 20, 1966.
6R-685	LTV, Analysis of Scout Vehicle Vibration Data S-139, NAS1-4664, October 21, 1966.
23.290	LTV, Failure Mode, Effects and Criticality Analysis of the Scout Destruct Subsystem, October 27, 1966.
5R-240	LTV, Configuration Control Operating System for Scout, October 28, 1966.
23.303	LTV, Qualification Test Report of Headcap Pressure Transducer, October 28, 1966.
6R-29	LTV, Scout S-155C Preflight Planning Report, October 28, 1966.

REPORT NUMBER (If available)	
6R-28	LTV, Scout S-149C Final Flight Report, NAS1-4664, October 31, 1966.
23.297	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Structure, October 31, 1966.
23.305	LTV, FW-4S Test Plan ATJ Graphite (Class I) Throat Insert, NAS1-5883, November 1966.
6R-30	LTV, Scout S-148C Final Flight Report, NAS1-4664, November 4, 1966.
	LTV, Vehicle 154C Narrative End Item Report, NAS1-4664, November 11, 1966.
23.306	LTV, Ignition System Evaluator Test, Middle "D" Prototype Harness, November 11, 1966.
23-TRA-0048	LTV, Metallurgical Examination of the Scout AZ-91-T6 Magnesium Blast Shield Casting, 23-003371-19, November 15, 1966.
23.304	LTV, NASA Scout Reliability Status Report for Month Ending October 31, 1966, November 15, 1966.
23.307	LTV, First Stage Moment Disturbance Routine, November 18, 1966.
RER-869	Thiokol Chemical Corp., Preliminary Design, 102.9 KS 60.6 Solid Propellant Rocket Motor, Control No. U-66-4205, November 22, 1966.
23.309	LTV, Simulated Vehicle Testing of the Scout Safe Arm Units, November 29, 1966.
A-900-11.12	Applied Physics Laboratory, A Simplified Passive Spacecraft Separation System TG-870, Copy No. 35, Technical Memorandum, December 1966.
23.310	LTV, Evaluation of the Scout Vehicle with a Velocity Package and a Minus-40-Inch Station, 34-Inch Diameter Heat Shield, December 9, 1966.
23.311	LTV, FW Telemetry Transmitter Evaluation, December 12, 1966.
23.299	LTV, Reliability Design Review Scout Hydraulic Control System, December 13, 1966.

REPORT NUMBER (If available)	
23.312	LTV, MCR 151C Command Destruct Receiver Evaluation Program, December 20, 1966.
23-TRA-0058	LTV, Evaluation of DC 92-009 Coating for Semi-Rigid Electrical Harness Application to the Scout Vehicle, December 27, 1966.
23.298	LTV, Reliability Design Review, Scout Guidance System, December 29, 1966.
23.313	LTV, FW-4S Test Plan ATJ Graphite Throat Insert, NAS1-5610, December 28, 1966.
	LTV, Vehicle S-155C Narrative End Item Report, January 4, 1967.
W-1115.2.13	WTR, Program Support Plan, Scout Vehicle (6500), January 6, 1967.
7R-1	LTV, Scout S-156C Preflight Planning Report, January 10, 1967.
23.256	LTV, Scout Upper Stage Control Fuel Consumption Analysis, NAS1-6020, January 11, 1967.
23.315	LTV, Scout Reliability Status Report for Month Ending December 31, 1966, January 15, 1967
23.316	LTV, Fit and Ejection Test of the NASA Scout 34-Inch Diameter A41 Heat Shield and United Kingdom UK-E Payload, January 19, 1967.
23.314	LTV, Filter Assembly for 500-Pound Thrust Motor Valve Mectron, P/N 21605, Contract NAS1-5592, January 20, 1967.
	LTV, Narrative End Item Report dated January 23, 1967, Vehicle S-156C, January 23, 1967.
7R-3	LTV, Final Flight Report Scout Vehicle S-150C, January 23, 1967.
23.319	LTV, Qualification Test Report of Improved Power Control Relay Box, MSD P/N 23-003381, January 31, 1967.
23.320	LTV, Quarterly Review of Scout Orbital Performance Capability, January 31, 1967.

REPORT NUMBER (If available)	
23.321	LTV, Scout Upper Stage Digital Computer Capture Routines, January 31, 1967
23.323	LTV, Flight Acceptance Test Plan for FY67 Scout Components, January 31, 1967.
23.318	LTV, Range Safety Information ESRO II Payload Mission, February 3, 1967.
23.231	LTV, Scout Third Stage Oscillation Study, NAS1-6020, February 6, 1967.
331.004	LTV, S-153C San Marco B Mission, Communications Format for Flight Data, February 15, 1956.
23.322	LTV, NASA Scout Reliability Status Report for Month Ending January 31, 1967, February 15, 1967.
23.325	LTV, Range Safety Information UK-E Payload Mission, February 15, 1967
253800/7R-689	LTV, Analysis of Scout Vehicle Vibration Data S-146, February 15, 1967.
253800/7R-690	LTV, Analysis of Scout Vehicle Vibration Data S-147, February 15, 1967.
7R-4	LTV, NASA Scout S-152 Preflight Planning Report (ESRO-II) February 17, 1967.
3-3000/7R-5	LTV, Scout S-155C Preflight Planning Report (UK-E) Mission, February 28, 1967.
	LTV, Vehicle 157C Narrative End Item Report, NAS1-6020, March 10, 1967.
23.326	LTV, NASA Scout Reliability Status Report for Month Ending February 28, 1967, March 15, 1967.
3-32000/7R-35	LTV, Scout Payload Coordination Status Report and Program Schedule, Reentry F, NAS1-6020, March 15, 1967.
00.921	LTV, Feasibility Study of Storage Concepts for Scout and Other NASA Solid-Propellant Launch Vehicles, NAS1-6748, March 15, 1967.

REPORT NUMBER (If available)	
3-30000/7R-6	LTV, Flight Test Plan SLV-1A Vehicle S-154C, March 17, 1967.
3-32000/7R-36	LTV, Roll and Yaw Compensation Feasibility Study, NAS1-5592, March 17, 1967.
3-320000/7R-38	LTV, Scout Payload Coordination Status Report and Program Schedule Solar Explorer B, March 1, 1967.
3-30000/7R-7	LTV, Scout S-151C Final Flight Report, March 17, 1967.
23.317	LTV, Specification Block Diagrams for FY67 Scout, March 20, 1967.
23.284	LTV, Reliability Design Review Scout Reaction Thrust System, March 20, 1967.
CR-66321	NASA, Feasibility Study of Storage Concepts for Scout and Other NASA Solid Propellant Launch Vehicles, R. D. Fielder and H. N. Nesbitt, April 1967.
U-66-57A	Thiokol Chemical Corp., Technical Description of the TX354-3 Rocket Motor No. 57A-66, April 7, 1967.
3-3000/7R-15	LTV, Scout Program Off-Site Range Stock IBM Listing, NAS1-6020, April 7, 1967.
3-30000/7R-8	LTV, Scout S-153C Preflight Planning Report, April 10, 1967.
CR-66397	NASA, Preliminary Design Study of SLAMAST, Scout Launched Advanced Materials and Structures Test Bed, Volumes I, II, and III, April 14, 1967.
23.327	LTV, NASA Scout Reliability Status Report for Month Ending March 31, 1967, April 15, 1967.
3-30000/7R-9	LTV, Flight Test Plan SLV-1A Vehicle S-156C, April 18, 1967.
2-59900/7R-691	LTV, Structural Load Test of the Modified FW-4S Motor Case Scout and Delta Loads, May 1967.
TR-67-64	Arnold Engineering and Development Company, Quality Test of a Castor II (TX354-3) Rocket Motor at Pressure Conditions, May 1967.

REPORT NUMBER (If available)	
TR-67-95	Arnold Engineering and Development Company, Performance Evaluation of a Hercules X-259-A3 Solid Propellant Rocket Motor S/N HIB-203 at Simulated Altitude Conditions, May 1967.
UTC-2268-FR1 and FR2	United Technology Center, Final Report, FW4S Motor Nozzle Throat Redesign Spin Test Firing of One FW4S, May 1967.
3-30000/7R-10	LTV, Scout S-159C Preflight Planning Report, May 8, 1967.
23.328	LTV, Vehicle 158C Narrative End Item Report, May 11, 1967.
23.329	LTV, NASA Scout Reliability Status Report for Month Ending April 30, 1967, May 15, 1967.
3-320000/7R-164	LTV, Test Report, Static Test Firing of Algol IIB-17, Test Conducted May 18, 1967, NAS1-5592.
259900/7R-692	LTV, Limit Load Test Report of FW-4S Motor Case (UTC S/N 30403), May 19, 1967.
23.332	LTV, FW-4S Nozzle Insert Redesign Configurations, May 25, 1967.
W-1115.2.16	WTR, Program 783 (9200) Program Support Plan, May 25, 1967.
23.330	LTV, Scout Reliability Status Report for Month Ending May 31, 1967.
TG-915	Applied Physics Laboratory, A Practical Solution to the Problem of Thermal Bending in Spacecraft Extendable Booms, by D. W. Rabenhorst, June 1967.
23.331	LTV, Program Test Plan for Reentry "F" and "G", Contract NAS1-6935, Task Order No. 4, June 20, 1967.
23.333	LTV, Vehicle 159C Narrative End Item Report, June 22, 1967.
TN-D-4050	NASA, Performance of X-258 Third-Stage Motor on Delta 36 (OT-3) by James E. Schmidt, July 1967.
3-32000/7R-124	LTV, Test Program for X-259 Rocket Motor Testing and Analysis, July 13, 1967.
23.334	LTV, NASA Scout Reliability Status Report for Month Ending June 30, 1967, July 15, 1967.

REPORT NUMBER (If available)	
3-30000/7R-11	LTV, Flight Test Plan SLV-1A Vehicle S-157C, July 17, 1967.
23-LRC-0084	LTV, Environmental Tests of Chlorotrifluoroethylene Fluorlube Lubricants Used in Scout Reaction Control System, July 25, 1967.
00.970	LTV, Test Report Torque Verification for Flared Steel Tubing With Wiggins Connectors, July 27, 1967.
W-1115.2.17	WTR, Program Requirements Document Scout Vehicle AD/IE Mission 6500-4, August 1967.
23.337	LTV, NASA Scout Reliability Status Report for Month Enging July 1967, NAS1-6020, August 1967.
3-32000/7R-168	LTV, Algol IIB Igniter PERT Program Motor Test Plan for Static Firing of an Algol IIB Motor Using a Propellant Igniter, August 1967.
23-LRC-0092	LTV, Hydrogen Peroxide Compatibility of Fire REsistant Sleeves for Flexible Hoses, August 1, 1967.
23.336	LTV, MSD-T-Final Summation of FW-4S Nozzle Redesign Program, August 3, 1967.
3-32000/7R-144	LTV, NASA Scout S-152C Final Flight Report, August 1, 1967.
23.338	LTV, Investigation of Flight Anomalies of the Scout Two-Pound Motor Valve, August 21, 1967.
23.324	LTV, Final Report Feasibility Study for a 44-Inch First Stage Rocket Motor, August 31, 1967.
CR-66545	LTV, Feasibility Study for the 44-Inch First Stage Rocket Motor, NAS1-6935, Task Order No. 1, August 31, 1967.
CR-66596	LTV, Scout Error Analysis Phase I Final Report, NAS1-6969, September 1967.
3-32000/7R-155	LTV, Scout S-154C Final Flight Report, NAS1-6020, September 5, 1967.
23-LRA-0081	LTV, Effect of Moisture on Filament Wound Epoxy-Glass No. 1 Rings, September 13, 1967.
3-32000/7R-39	LTV, Scout Payload Coordination Program Status OWL-A and B, September 15, 1967.

REPORT NUMBER (If available)	
3-16200/7R-2	LTV, Scout Program Off-Site Range Stock IBM Listing NAS1-6020, September 29, 1967.
23.335	LTV, Failure Mode, Effect, and Criticality Analysis of the Scout Mark-II Launcher, September 39, 1967.
3-32000/7R-171	LTV, Final Report, Scout S-152C Failure Investigation, Volumes I and II, October 9, 1967.
23.342	LTV, Final Report, Instrumentation to Determine and Improve Scout Vehicle Vertical and Roll Alinement, October 9, 1967.
23.341	LTV, NASA Scout Reliability Status Report for Month Ending September 30, 1967, October 15, 1967.
2392-TR-01	Thiokol Chemical Corp., Algol Motor IIB-61, Static Test Firing, Final Report, October 20, 1967.
3-32000/7R-182	LTV, Scout S-156 Final Flight Report, October 23, 1967.
3-32000/7R-190	LTV, Flight Test Plan SLV-1A Vehicle S-158C, October 30, 1967.
23.346	LTV, Scout Vehicle With German 625A Spacecraft Compatibility Study, November 1, 1967.
23.340	LTV, Program Test Plan for Scout Standrad Fifth Stage, November 3, 1967.
23.347	LTV, NASA Scout Reliability Status Report for Month Ending October 31, 1967, November 15, 1967.
W-1115.2.18	WTR, Operations Directive, AFWTR OD, Directive 7600, Cancels and Supersedes OD 7600 With Revisions dated March 15, 1967, November 17, 1967.
23.350	LTV, Vehicle 160C Narrative End Item Report, December 6, 1967.
23-TRA-0080	LTV, Tensile Modulus and Thermal Expansion Tests of ATJ Graphite Billets, 74 and 77, December 14, 1967.
23.349	LTV, NASA Scout Reliability Status Report for Month Ending November 30, 1967, December 15, 1967.
23.164	LTV, Receiving, Bench and Transition Tests, NASA/DOD Scout Vehicle S-140 and Subsequent, December 15, 1967.

REPORT NUMBER (If available)	
2392-01F	Contract NAS1-5610, Final Report, Algol IIB Motor Production Program, December 22, 1967
23.343	LTV, Final Program Test Report for Reentry "F" and "G", December 22, 1967.
3-32000/7R-226	LTV, Flight Test Plan SLV-1A, Vehicle S-162, December 29, 1967.
23.344	LTV, Altair II X-258 Motor Design Review, NAS1-6020, January 5, 1968.
3-32000/8R-12	LTV, Test Plan - FW-4S Motor Altitude Test - Motor S/N 2218-9, January 10, 1968.
23.351	LTV, Scout Reliability Status Report for Month Ending December 31, 1967, January 15, 1968.
3-32000/8R-13	LTV, Scout S-157C Final Flight Report, January 15, 1968.
3-32000/8R-19	LTV, Scout S-160C Preflight Planning Report, January 23, 1968.
23.353	LTV, Vehicle 162C Narrative End Item Report, January 30, 1968.
23.355	LTV, Vehicle S-164C Narrative End Item Report, February 9, 1968.
23.354	LTV, NASA Scout Reliability Status Report for Month Ending January 31, 1968, February 15, 1968.
23.357	LTV, X-258 Igniter Shelf Life Study, February 26, 1968.
3-32000/8R/46	LTV, Scout S-159C Final Flight Report, February 29, 1968.
23.348	LTV, Scout "E" Section Vibration Evaluation Test Report, March 5, 1968.
3-32000/8R-50	LTV, Scout S-164 Preflight Planning Report, March 8, 1968.
23.358	LTV, Scout First Stage Flight Characteristics, March 15, 1968.
H230-12-9-5	Hercules, Final Report, Manufacture and Delivery of X-259-B3 Rocket Motors, March 15, 1968.
23.359	LTV, Vehicle 161C Narrative End Item Report, March 19, 1968.

REPORT NUMBER (If available)	
3-32000/8R-60	LTV, Scout S-160 First Stage Anomaly Investigation, Preliminary Report, March 29, 1968.
23.361	LTV, Quarterly Review of Scout Orbital Performance Capability, April 8, 1968.
23.362	LTV, Scout Reliability Status Report for Month Ending March 31, 1968, April 15, 1968.
H-935.30.17	Recommended Programs for Advance Space Technology, April 17, 1968.
3-32000/8R-78	LTV, Scout S-161 Preflight Planning Report, April 22, 1968.
3-32000/8R-83	LTV, Scout S-158 Final Flight Report, May 6, 1968.
	LTV, Feasibility Study for Using Minuteman First Stage Rocket Motor on the Scout Vehicles, Task I and II Review Submittal, NAS1-6935-8, May 17, 1968.
23.367	LTV, Final Report Fit and Ejection Test of Scout A-47 Heat Shield and AD/IC Payload, May 20, 1968.
3-32000/8R-100	LTV, Scout S-160C Final Flight Report, May 24, 1968.
23.371	LTV, Investigation of Scout Vehicle S-160 Anomaly - Algol IIB Nozzle Thermal, Thermoelastic and Reliability Analyses, June 1968.
23.369	LTV, Vehicle S-163C Narrative End Item Report, June 5, 1968.
23.368	LTV, NASA Scout Reliability Status Report for the Month Ending May 31, 1968, June 15, 1968.
23.366	LTV, Failure Mode Effects and Criticality Analysis of Five Stage Scout Systems, June 17, 1968.
23.345	LTV, Design Data Report, Scout Fifth Stage, June 18, 1968.
23.372	LTV, Vehicle S-165C, Narrative End Item Report, June 25, 1968.
3-32000/8R-118	LTV, Scout Payload Coordination Status Report and Program Schedule for FR-2, July 1, 1968.

REPORT NUMBER (If available)	
3-32000/8R-117	LTV, Scout Payload Coordination Status Report and Program Schedule for SAS-A, July 1, 1968.
3-32000/8R-116	LTV, Scout Payload Coordination Status Report and Program Schedule for N-15, July 1, 1968.
3-32000/8R-115	LTV, Scout Payload Coordination Status Report and Program Schedule for N-14, July 1, 1968.
23.370	LTV, Range Safety Information AD/IC Payload Mission, July 1, 1968.
3-32000/8R-126	LTV, NASA Scout Vehicle S-165C Preflight Planning Report, July 8, 1968.
23.375	LTV, Final Report Fit and Ejection Test of Scout A-45 Heat Shield and ESRO I Payload, July 10, 1968.
3-32000/8R-132	LTV, Scout S-162 Final Flight Report, July 12, 1968.
23.373	LTV, NASA Scout Reliability Status Report for Month Ending June 30, 1968, July 15, 1968.
23-TRA-0104	LTV, Material Test of Viton "0" Rings by Hydrogen Peroxide Impression, July 19, 1968.
3-32000/8R-137	LTV, Scout S-168C Preflight Planning Report, July 19, 1968.
23.376	LTV, Feasibility Study for Using Minuteman First Stage Rocket Motor on Scout Vehicles, July 19, 1968.
U-68-31A	Thiokol Chemical Corp., Final Report Scout Motor Program LTV Purchase Order P-208051-AER, July 23, 1968.
23.377	LTV, Vehicle S-168C Narrative End Item Report, July 29, 1968.
3-32000/8R-141	LTV, Scout S-164C Final Flight Report, July 30, 1968.
23.379	LTV, Standard Repairs and Deviations Manual, August 1, 1968.
00.1075	LTV, Test Report Torque Valves for 3/16 and 1/4 Inch Steel AS360F316 Tube Fittings, August 13, 1968.
3-32000/8R-143	LTV, Scout S-153C Final Flight Report, August 15, 1968.
23.378	LTV, Scout Reliability Status Report for Month Ending July 31, 1968, August 15, 1968.

REPORT NUMBER (If available)	
23.381	LTV, Vehicle S-167 Narrative End Item Report, August 29, 1968.
3-32000/8R-156	LTV, Scout S-161C Final Flight Report, August 30, 1968.
3-32000/8R-159	LTV, Scout S-167C Preflight Planning Report, September 4, 1968.
23-LRA-0124	LTV, Hydrogen Peroxide Compatibility Test on Parco and Parker Viton "O" Rings, September 11, 1968.
23.380	LTV, NASA Scout Reliability Status Report for Month Ending August 31, 1968, September 15, 1968.
23.360	LTV, FW-4S Motor Design Review, September 26, 1968.
23.269	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Guidance and Control Subsystem, NAS1-4664, Revision A, October 1966.
23.374	LTV, Summary Report Transportation Test FW-4S Rocket Motor and Metal Container NASA P/N LE-917580, October 4, 1968.
3-32000/8R-185	LTV, Algol Nozzle NDT Evaluation Program, October 14, 1968.
3-32000/8R-186	LTV, Evaluation of Physical and Mechanical Properties of Elder Built Algol IIB Nozzles, October 14, 1968.
23.382	LTV, NASA Scout Reliability Status Report for Month Ending September 30, October 15, 1968.
3-32000/8R-189	LTV, Test Results from FW-4S Altitude Firing Strain Gage Measurements, October 15, 1968.
3-32000/8R-190	LTV, Scout S-165C Final Flight Report, October 18, 1968.
3-32000/8R-195	LTV, X-259 Motor Radiographic Reinspection, October 25, 1968.
3-32000/8R-194	LTV, Scout S-168C Final Flight Report, October 30, 1968.
23.384	LTV, Vehicle S-169C Narrative End Item Report, October 31, 1968.
TR-68-253	Arnold Engineering and Development Company, Performance of a UTC FW-4S Solid Propellant Rocket Motor Under the Combined Effects of Simulated Altitude and Rotational Spin, November 1968.

REPORT NUMBER (If available)	
23.383	LTV, NASA Scout Reliability Status Report for Month Ending October 31, 1968, November 15, 1968.
A-900.5.38	Orbiting Frog Otolith Project, Preliminary Design Final Report for Part 1, Report No. 1223-11, Volume III, Part 2 Addendum, December 2, 1968.
23.352	LTV, Program Test Report Scout Standard Fifth Stage, Volumes I and II, December 6, 1968.
23.388	LTV, Final Report Roll and Yaw Compensation Prototype Development, December 20, 1968.
23.386	LTV, Scout Vehicle Tunnels Analysis and Test, December 22, 1968.
23.387	LTV, Scout Fifth Stage Dynamic Response Analysis, January 1969.
23.391	LTV, Summary Report Testing Activities on FW-4S Motor S/N 2218-9, January 2, 1969.
L-TRA-0130	LTV, Evaluation of LG 160 Grease as an Alternate Protective Coating for the 6061-T6 500-Pound Motor Valve and Filter, January 8, 1969.
23.389	LTV, NASA Scout Reliability Status Report for Month Ending December 31, 1968, January 15, 1969.
3-34100/9R-7	LTV, Scout S-167 Final Flight Report, January 15, 1969.
23.393	LTV, Scout Standard Fifth Stage Assembly Flight Acceptance Test, Flight A, S/N 1, January 17, 1969.
23.394	LTV, Scout Vehicle S-163 and Subsequent Weight Report, January 20, 1969.
23.385	LTV, Scout Vehicles S-163 and Subsequent Stress Analysis, NAS1-7256, January 30, 1969.
23.389	LTV, Scout Aerodynamic Design Data Report, January 31, 1969.
23.395	LTV, Scout Performance and Trajectory Report, NAS1-7256, January 31, 1969.
23.392	LTV, Scout Structural Dynamics Report, NAS1-7256, January 31, 1969.

REPORT NUMBER (If available)	
U-69-16A	Thiokol Chemical Corp., Final Report Qualification of a Modified Apollo Standard Initiator in the TX463-1 Pyrogen Igniter, February 1969.
23.396	LTV, NASA Scout Reliability Status Report for Month Ending February 28, 1969, March 15, 1969.
23.397	LTV, Reliability Requirements for Algol III Motor, March 17, 1969.
3-34100/9R-12	LTV, Scout Flight Data Historical Summary, March 17, 1969.
23.398	LTV, Specification Block Diagrams for FY68 Scout, April 1969.
23.400	LTV, Design Criteria, Items Used in Testing and Servicing the Scout Hydrogen Peroxide System, April 28, 1969.
TR-69-94	Arnold Engineering and Development Company, Performance of Two Hercules BE-3-A9 Solid Propellant Rocket Motors Under the Combined Effects of Simulated Altitude and Rotational Spin, May 1969.
23.303	LTV, FW-4S Nozzle Examination, May 1969.
23.401	LTV, Final Report Hydraulic Test Equipment Procurement and Manufacturing Thereof, NAS1-6935-19, May 14, 1969.
23.399	LTV, NASA Scout Reliability Status Report for Period Ending April 30, 1969, May 15, 1969.
23.403	LTV, Algol III Technical Program Plan, May 19, 1969.
CR-66773	LTV, Final Report, Scout Standard Fifth Stage BE-3-A9 Rocket Motor Propulsion Unit Program, NAS1-7102, May 20, 1969.
L-23-TRA-0133	LTV, FW-4S Motor Nozzle Examination, NAS1-6935, Task Order 21, May 26, 1969.
23.405	LTV, Description of the Scout Radar Data Routine, June 5, 1969.
23.406	LTV, Vehicle S-170C Narrative End Item Report, June 9, 1969.

REPORT NUMBER (If available)	
L-23-TRA-0136	LTV, Examination of Two Bourns Model 725 Pressure Transducer Sample Brazed Joints, June 12, 1969.
23.407	LTV, Investigation of New Radiographic Procedures for NDT of Scout Nozzles, NAS1-6935, Task Order 25, June 30, 1969.
2699-TR-02F	Qualification of Vertical Batch Mixed ANP-2872 Propellant for Algol IIB Motors, June 30, 1969.
U-69-27A	Thiokol Chemical Corp., Shelf Life Extension Study, Castor IIA (TX354-3) Rocket Motor, Report No. 27-69, July 1969.
23.409	LTV, Final Report, Improved Second Stage Coast Control System Feasibility Study and Preliminary Design, Contract NAS1-6935, Task Order 17, July 1969.
23.408	LTV, NASA Scout Reliability Status Report for Period Ending June 30, 1969, July 15, 1969.
23.410	LTV, Design Review of Scout Rocket Motors, Phase I, Volume 1, Technical Report and Recommendations, NAS1-6935, Task Order 23, July 15, 1969.
23.411	LTV, Study of Effects on Incorporating a Larger Heat Shield on the Scout Vehicle, NAS1-6935, Task Order 24, July 24, 1969.
9R-95	LTV, NASA Scout S-172C (ESRO-IB Mission) Preflight Planning Report, August 22, 1969.
9R-100	LTV, NASA Scout S-169C (GRS-A Mission) Preflight Planning Report, September 3, 1969.
23.412	LTV, Phase I Report, Study of Improved Materials for Use in Scout Solid Rocket Motors Nozzles, NAS1-6935, Task Order 20, September 6, 1969.
23.414	LTV, NASA Scout Reliability Status Report for Month Ending August 31, 1969, September 15, 1969.
23.415	LTV, Vehicle S-172C Narrative End Item Report, September 16, 1969.
23.413	LTV, Design Review of Roll and Yaw Compensation Unit, NAS1-6935-30, October 1969.

REPORT NUMBER (If available)	
W-1115.2.19	WTR, Program Requirements Document for the Navy Navigation Satellite System (NNSS), October 1969.
LWP-804	Scout Launch Vehicle Program, Final Report on Phases I, II, and III, by Abraham Leiss and Edith R. Horrocks, October 20, 1969.
3-34100/9R-123	LTV, Scout S-172C Final Flight Report, November 3, 1969.
23.180	LTV, Program Test Plan and Report for Scout Stnadard EG Section, November 4, 1969.
23.417	LTV, Reliability Status Report for Period Ending October 31, 1969, November 15, 1969.
23.421	LTV, Vehicle S-174C Narrative End Item Report, December 2, 1969.
23.422	LTV, Study, Selection and Qualification of Scout S-Band Telemetry Components, NAS1-6935, Task Order 10, December 15, 1969.
3-34100/0R-1	LTV, Scout S-169C Final Flight Report, January 12, 1970.
23.424	LTV, NASA Scout Reliability Status Report for Period Ending December 31, 1969, January 15, 1970.
23.426	LTV, Semiannual Review of Scout Orbital Performance Capability, January 30, 1970.
23.427	LTV, Jet Vane Effectiveness Test Plan, February 6, 1970.
23.428	LTV, Test Plan Structural Load Test Scout First Step With Algol III Motor, February 18, 1970.
23.420	LTV, Analysis Procedures for Determining Scout Motor Performance, February 20, 1970.
23.363	LTV, Final Test Report, Response of Scout Destruct Charges to High Heat Fluxes and Sympathetic Initiation and Influence of Destruct Action on Inert Propellant, February 28, 1970.
23.432	LTV, Vehicle S-171C Narrative End Item Report, March 9, 1970.
23.430	LTV, Scout Reliability Status Report for Period Ending February 28, 1969, March 15, 1970.

REPORT NUMBER (If available)	
23.431	LTV, Final Report for the Examination of the Postfired Condition of an FW-4S Rocket Motor Case, NAS1-6935-39, March 22, 1970.
23.425	LTV, Fit and Ejection Test of the NASA Scout 34-Inch Diameter A57 Heat Shield and the OFO-A and RMS Payloads, April 1970.
23.429	LTV, Upper Stage Moment Disturbance Routine LAO 246, NAS1-7256, April 2, 1970.
23.435	LTV, Algol IIB Nozzle Rebuilding Program, Contract NAS1-6935-18, April 10, 1970.
23.437	LTV, Program Test Plan for Testing of Modified Scout Jet Vanes, April 21, 1970.
23.436	LTV, Fit and Ejection Test of the NASA Scout 34-Inch Diameter A-62 Heat Shield and the RAM C-C Payload, April 27, 1970.
23.434	LTV, Scout Flight Restrictions, April 30, 1970.
23.439	LTV, Qualification Test Report Fourth Stage Limiting Resistor Assembly MSD-T P/N 23-003448, April 30, 1970.
G-930.6	General Electric, Nondestructive Testing of Scout Rocket Motors, May 1970.
T-1100.1.94	Thiokol Chemical Corp., Final Report Scout Motor Program LTV Purchase Order P-800279 MSD, May 8, 1970.
23.438	LTV, LTV, NASA Scout Reliability Status Report for Period Ending April 30, 1970, May 15, 1970.
23.440	LTV, Fit and Ejection Test of the NASA Scout 34-Inch Diameter A-61 Heat Shield and the SAS-A Payload, May 25, 1970.
23.433	LTV, Missile Flight Safety Data for In-Flight Safety Approval for the N-Series Payload Mission, June 1, 1970.
3-34100/OR-25	LTV, NASA Scout S-174C (OFO-A/RMS Mission) Preflight Planning Report, June 17, 1970.
23.443	LTV, Vehicle V-176, Narrative End Item Report, NAS1-7256, June 23, 1970.
LMSC/D007201	Dilger, J. W.; Determining Scout Vehicle Spinning Body Attitude from Accelerometer Histories - Feasibility Study of a Kinematical Method, June 30, 1970.

REPORT NUMBER (If available)	
23.445	LTV, Vehicle V-177C Narrative End Item Report, July 2, 1970.
23.442	LTV, Test Plan Structural Load Test Scout 42-Inch Diameter Heat Shield, July 9, 1970.
23.444	LTV, NASA Scout Reliability Status Report for May and June 1970, July 15, 1970.
3-34100/OR-85	LTV, Flight Test Plan Vehicle S-176C, July 24, 1970.
23.441	LTV, Fit and Ejection Test of the NASA Scout 34-Inch Diameter A-400 Heat Shield and the SSS-A Payload, August 5, 1970.
3-34100/OR-79	LTV, Scout S-171C, Preflight Planning Report, August 17, 1970.
23.447	LTV, NASA Scout Reliability Status Report for July and August, September 15, 1970.
3-34100/OR-108	LTV, Final Report Fabrication and Integration of Five G-Sections Into the Scout Vehicle System, NAS1-6935, Task Order 37, September 17, 1970.
23.458	LTV, Test Plan Scout 42-Inch Diameter Heat Shield Free Fall Ejection Test, September 21, 1970.
23.461	LTV, Vehicle S-175 Narrative End Item Report, September 24, 1970.
3-34100/OR-116	LTV, Vehicle S-175C Preflight Planning Report, October 7, 1970.
23.462	LTV, Structural Load Test Algol III First Step Assembly, October 9, 1970.
23.446	LTV, Scout Preflight Trajectory Analysis Procedures, October 15, 1970.
23-TRA-0153	LTV, Post-Fire Examination of Scout Tungsten-Copper Jet Vanes, October 15, 1970.
23.460	LTV, Summary of Scout Vehicle Structural Tests, October 21, 1970.
3-34100/OR-126	LTV, Scout S-176C Final Flight Report, October 30, 1970.

REPORT NUMBER (If available)	
2699-TR-03F	Arnold Engineering and Development Corp., Final Report Algol IIB Motor Production Program, October 30, 1970.
23.463	LTV, Scout Reliability Status Report for September and October 1970, November 15, 1970.
3-34100/OR-130	LTV, NASA Scout S-177C (SOLRAD C Mission) Preflight Planning Report, November 15, 1970.
23.465	LTV, Investigation of Control Surface Effectiveness Immersed in a Rocket Exhaust, November 16, 1970.
3-34100/OR-133	LTV, Scout S-171C Final Flight Report, November 30, 1970.
23.464	LTV, Experimental Stability and Control Characteristics of a Scout Fin With an Enlarged Tip Control at Mach Numbers From 0.4 to 4.63, December 15, 1970.
U-1105.1.8	United Technology Center, FW-4S Shelf Life Extension Program, Final Report UTC-2371-FR, NAS1-6935-38, December 16, 1970
23.470	LTV, Scout Vehicle S-178 and Subsequent Weight Report, January 1971.
23.467	LTV, Required Information for Scout Spacecraft Dynamic Response Analyses, January 6, 1971.
3-34100/1R-1	LTV, Flight Test Plan Scout Vehicle S-178C, January 11, 1971.
23.466	LTV, Scout Reliability Status Report for November and December 1970, January 15, 1971.
23.468	LTV, Vehicle S-178 Narrative End Item Report, January 15, 1971.
23.469	LTV, Algol III Demonstration Program Report Performed at Wallops Island, Virginia, January 19, 1971.
23.450	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Destruct Subsystem, Vehicle Configuration S-163 Through S-192, January 26, 1971.
23.423	LTV, Reconfiguration of Lower "D" Section to Accommodate S-Band Telemetry System, NAS1-6935, Task Order 13, February 1971.

REPORT NUMBER (If available)	
23.472	LTV, Semi-Annual Review of Scout Orbital Performance Capability, February 9, 1971.
23.474	LTV, Vehicle S-166C Narrative End Item Report, February 16, 1971.
23.457	LTV, Failure Mode Effects and Criticality Analysis of the Scout Heat Shield Separation Subsystem for 34-Inch Diameter (-40) Nose Cap Station Heat Shield, March 1, 1971.
23.473	LTV, Program Test Report 42-Inch Diameter Heat Shield, March 2, 1971.
23.476	LTV, NASA Scout Reliability Status Report for January and February 1971, March 15, 1971.
23.475	LTV, Vehicle S-173 Narrative End Item Report, March 16, 1971.
3-34100/1R-16	LTV, Scout S-166C (GRP-A Mission), Preflight Planning Report, March 18, 1971.
3-34100/1R-17	LTV, Scout S-173C Preflight Planning Report, March 19, 1971.
23.477	LTV, Scout Reaction Control Systems Design Data Report Vehicles 163 Through 192, March 19, 1971.
23.480	LTV, Scout Stability and Control Report, March 31, 1971.
23.481	LTV, NASA Scout Thermal Protection Requirements Vehicles 163 Through 192, March 19, 1971.
23.479	LTV, Destruct System Analysis Report for Vehicles S-144 and S-163 Through S-192, NAS1-10000, April 1971.
23.482	LTV, Fit and Ejection Test of the NASA Scout 42-Inch Diameter A-502 Heat Shield and the PAET Payload, NAS1-10000, April 1971.
L-955.18.6	Lockheed-Missiles Systems Division, Final Report Scout Trajectory Reconstruction Program, SPEAR, April 1971.
3-34100/1R-11	LTV, Scout S-174C Final Flight Report, April 2, 1971.
23.484	LTV, Mark II Launcher Proof-Load Report for Algol III Scout Loads, NAS1-9258, April 15, 1971.

REPORT NUMBER (If available)	
23.485	LTV, Vehicle S-144CR Narrative End Item Report, April 20, 1971.
3-34100/1R-28	LTV, Test Plan Algol III Qualification Round No. 2 Scout Vehicle, April 22, 1971.
23.487	LTV, Scout Payload Ignition Separation Ignition Timers - Industry Survey, NAS1-10000, Task R-1, May 1971.
23.488	LTV, Fourth-Stage Attitude Control System Study - Advanced Effort, May 4, 1971.
3-34100/1R-32	LTV, S-144CR Preflight Planning Report, May 14, 1971.
23.486	LTV, Scout Reliability Status Report for Months of March and April 1971, May 15, 1971.
23.454	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Radar Beacon Subsystem, Vehicle Configuration S-163 and Subsequent, May 26, 1971.
3-34100/1R-38	LTV, Scout S-175C Final Flight Report, June 4, 1971.
23.489	LTV, Qualification Test Report for Third and Fourth-Stage Delay Initiators, NAS1-5592, June 10, 1971.
3-34100/1R-42	LTV, Scout S-180C Preflight Planning Report, June 15, 1971.
23.490	LTV, Vehicle S-180 Narrative End Item Report, June 16, 1971.
23.491	LTV, Final Program Report for Development and Qualification of Third and Fourth-stage Delay Initiators, LTV/MSD P/N 23-003503-1 and 3506-1, NAS1-5592, June 25, 1971.
23.483	LTV, Test Plan Structural Load Test Scout Fourth-stage With 200-Series "E" Section, July 12, 1971.
23.492	LTV, Scout Reliability Status Report for May and June 1971, July 15, 1971.
23.495	LTV, FW-4S Igniter Shelf Life Test Report, July 30, 1971.
23.493	LTV, Fit and Ejection Test of the NASA Scout 34-Inch Diameter A-63 Heat Shield and the UK-4 Payload, August 1971.
23.496	LTV, Vehicle S-181 Narrative End Item Report, August 2, 1971.
3-34100/1R-47	LTV, Scout S-181C Preflight Planning Report (CAS-B), August 16, 1971.

REPORT NUMBER (If available)	
23.452	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Guidance and Control Subsystem for Vehicle Configuration S-178 Through S-192, August 17, 1971.
23.497	LTV, NASA Scout Reliability Status Report for July and August 1971, September 15, 1971.
L-955.17.63	LRC, Static Aerodynamic Characteristics of a Scout Fin With an Enlarged Tip Control at Mach Numbers From 0.40 to 4.63, by R. J. Keynton and Thomas G. Muir, September 1971.
23.499	LTV, Vehicle S-163CR Narrative End Item Report, September 17, 1971.
23.500	LTV, Investigation Into the Anomaly of an Inadvertent Relay Transfer on the Timer/Battery Assembly, Volume I and II, September 22, 1971.
23.456	LTV, Scout Failure Mode, Effects, and Criticality Analysis of the Separation Subsystem for Vehicle Configuration S-178 and Subsequent, October 4, 1971.
3-34100/1R-140	LTV, Scout S-163CR (SSS-A Mission) Preflight Planning Report, October 5, 1971.
23.455	LTV, Failure Mode, Effects, and Criticality Analysis of the Scout Reaction Control Subsystem Vehicle Configuration S-178 and Subsequent, October 8, 1971.
23.502	LTV, Vehicle S-183C Narrative End Item Report, October 13, 1971.
23.503	LTV, Vehicle S-179 Narrative End Item Report, October 15, 1971.
23-TRA-0177	LTV, Examination of Scout Tungsten-Copper Jet Vanes and Bonnets After Algol III Motor Qualification Firings 1 and 2, October 27, 1971.
T-1100.1.95	Thiokol, Final Report TX354 Shelf Life Extension Program, VMSC Purchase Order MSD-820237-UE, November 1971.
23.507	LTV, Vehicle S-182C Narrative End Item Report, November 1971.
23.506	LTV, Scout Vehicle Family Tree, November 1, 1971.

REPORT NUMBER (If available)	
3-34100/1R-73	LTV, Scout S-183C Preflight Planning Report, November 5, 1971.
23.505	LTV, Fourth-stage Instrumentation/Ignition Module (Final Report), November 5, 1971.
23.504	LTV, Scout Reliability Status Report for September and October 1971, November 15, 1971.
3-34100/1R-78	LTV, Scout S-173C Final Flight Report, November 30, 1971.
3-34100/2R-5	LTV, Scout S-177 Final Flight Report, February 23, 1972.
3-34100/2R-20	LTV, Scout S-166C Final Flight Report, April 7, 1972.
3-34000/2R-28	LTV, Scout S-163CR Final Flight Report, May 24, 1972.
2-16000/3R-20	LTV, Scout S-170CR Final Flight Report, May 2, 1973.

APPENDIX I

REVISIONS TO LWP-804

APPENDIX I

REVISIONS TO LWP-804

Due to the redetermination of Government contracts, additional credits, and finalization and close out of contracts with a newer rate structure, the financial data presented in working paper LWP-804 is not current. Therefore, following is the latest current financial data available.

Revisions shown are of three types: additional data (A), change in total due to other revision (C), or typing error (T).

PAGE NO.	TYPE OF REVISION	REFERENCE INFORMATION	PUBLISHED	CORRECT DESIGNATION
69	T	Second paragraph	XXXI	XXXIV
73	A	4-24-70 62	-	$ -29,844.00
73	C	Subtotal FY 1962	$2,941,062.39	2,911,218.39
73	C	LRC Allotment	2,929,722.39	2,899,878.39
73	C	Total NASA	23,187,293.65	23,157,449.65
74	C	Suballot. GSFC #1	24,713.54	24,546.54
74	C	Subtot. FY 1962	6,582,984.92	6,582,817.92
74	C	Total NASA (490)	29,625,284.92	29,625,117.92
76	A	4-24-70	-	-4,569.00
76	C	Subtot. FY 1963	1,874,760.32	1,870,191.32
76	C	LRC Allot.	1,778,944.69	1,774,375.69
76	C	Total San Marco	2,712,493.45	2,707,924.45
89	C	Wallops Island FY1959	386,991.57	386,584.82
89	C	Total Wallops Island	1,142,175.80	1,141,769.08
89	C	Total (LRC) FY 1959	7,176,488.00	7,176,081.25
89	C	Total FY 1959	7,176,488.00	7,176,081.25
89	C	Total (LRC)	23,187,293.65	23,186,886.90
89	C	Total	25,614,293.65	25,613,886.90
95	C	Vehicle	11,546,506.39	11,516,661.42
95	C	Total Development	19,386,199.85	19,356,354.88
99	C	Vehicles	5,760,900.40	5,760,662.40
99	C	Spares	574,528.96	558,435.96
99	C	Total (not includ.Spares)	957,592.12	955,959.02
99	C	NASA (3), Phase II	2,872,776.36	2,867,877.06
99	C	NAVY (5), Phase II	4,787,960.61	4,779,795.10
99	C	Air Force (2), Ditto	1,915,184.24	1,911,918.04
99	C	Total (10), Phase II	9,575,921.21	9,559,590.20
99	C	NASA Specials	1,765,926.38	1,685,664.38
99	C	NAVY Specials	735,799.20	735,168.20
99	C	Total, Specials	3,229,066.78	3,148,173.78
99	C	NASA, Total Phase II	4,638,702.74	4,553,541.44
99	C	NAVY, Total Phase II	5,523,759.81	5,514,963.30
99	C	Air Force, Total Ditto	2,552,525.44	2,549,259.24

PAGE NO.	TYPE OF REVISION	REFERENCE INFORMATION	PUBLISHED	CORRECT DESIGNATION
99	C	Total Phase II	$12,804,987.99	$12,707,763.98
99	C	Actual Scout Costs Per Vehicle:		
		NASA	1,546,234.25	1,517,847.14
		NAVY	1,104,751.89	1,102,992.66
		AIR FORCE	1,164,525.44	1,161,259.24
102	C	Vehicles, 20.200.449, NAS1-1928-14	24,475.00	24,237.00
102	C	Tot. Veh. Expend.	5,760,900.40	5,760,662.40
105	C	Spares, P26-051, NAS1-2165	21,000.00	4,907.00
105	C	Total Spares	574,528.96	558,435.96
106	C	Wallops, P23-064, NAS1-2189	600,000.00	527,289.00
106	C	Wallops Subtotal	600,870.57	528,159.57
107	C	Prod. Sup., P07944, NAS1-1928-8	45,950.00	38,399.00
107	C	Production Support, Subtotal	362,786.99	355,235.99
107	C	Supporting Activities, Subtotal	963,682.99	883,420.99
107	C	NASA Specials Subtotal	1,765,926.38	1,685,664.38
108	C	Prod. Sup., 20.200.074, NAS1-2165-4(c5)	631.00	0
108	C	Production Support Subtotal	556,961.20	556,330.20
108	C	Supporting Activities Subtotal	656,961.20	656,330.20
108	C	NAVY Specials Subtotal	735,799.20	735,168.20
110	C	Total Specials	3,229,066.78	3,148,173.78
113	C	Vehicles	13,097,428.93	13,095,114.93
113	C	Spares	1,005,097.26	978,318.26
113	C	Total (not including Specials)	19,892,064.64	19,862,971.64
113	C	Cost per Scout	1,420,861.76	1,418,783.68
113	C	Phase III Scouts: NASA	15,629,479.36	15,606,620.51
		NAVY	1,420,861.76	1,418,783.71
		AIR FORCE	1,420,861.76	1,418,783.71
		AEC	1,420,861.76	1,418,783.71
		TOTAL (14)	19,892,064.64	19,862,971.64
113	C	Specials: NASA	2,466,091.32	2,426,574.32
		TOTAL (14)	3,597,822.64	3,558,305.64
113	C	Total Phase III: NASA	18,095,570.68	18,033,194.83
		NAVY	1,587,197.44	1,585,119.39
		AIR FORCE	1,498,038.78	1,495,960.73
		AEC	2,309,080.38	2,307,002.33
		TOTAL (14)	23,489,887.28	23,421,277.28
113	C	Actual Costs per Vehicle:		
		NASA	1,645,051.88	1,639,381.34
		NAVY	1,587,197.44	1,585,119.39
		AIR FORCE	1,498,038.78	1,495,960.73
		AEC	2,310,080.38	2,308,002.33
115	T	Title	Phase II	Phase III
117	C	60.400.326, NAS1-3899-31	18,674.00	16,360.00
117	C	Total Vehicles Expenditures	13,097,428.93	13,095,114.93
120	C	20.200.077, NAS1-2165-4(c2)	48,441.00	34,687.00
120	C	20.200.085, NAS1-2165-4(c3)	33,000.00	23,157.00

PAGE NO.	TYPE OF REVISION	REFERENCE INFORMATION	PUBLISHED	CORRECT DESIGNATION
121	C	20.200.129, NAS1-2165-8	$ 3,182.00	$ 0
121	C	Total Spares Expenditures	1,005,097.26	978,318.26
122	C	20.200.392, NAS1-1928-6-2	27,109.00	16,607.00
122	C	Mission Mods Subtotal	155,078.00	144,576.00
123	C	20.200.383, NAS1-2189-7(c3)	29,015.00	0
123	C	Wallops Station Subtotal	2,228,149.80	2,199,134.80
123	C	Supporting Activities Subtotal	2,311,013.32	2,281,998.32
123	C	NASA Specials	2,466,091.32	2,426,574.32
126	C	Total Specials Expenditures	3,597,822.64	3,558,305.64
133	C	Vehicle Development, FY 1959	2,262,533.67	2,262,126.92
133	C	Subtotal	11,546,506.39	11,546,099.64
133	C	Phase I Subtotal	19,386,199.85	19,385,793.10
133	C	Total LRC-Scout DEV.	23,187,293.65	23,186,886.90
133	C	Total Scout DEV.	25,614,293.65	25,613,886.90
153	C	P38-005, L-8735	40,000.00	8,000.00
153	C	Motors Subtotal	669,460.41	637,460.41
153	C	Phase I Subtotal	1,653,649.71	1,621,649.71
160	C	Specs., 007944, NAS1-1928-8	45,950.00	38,399.00
160	C	Specs. Subtotal	99,849.55	92,298.55
160	C	Phase II Scout Program Subtotal	674,570.78	667,019.78
162	C	20.200.138, NAS1-2455-11	57,692.00	56,022.00
163	C	GSE-Wallops Subtotal	345,053.08	343,383.08
164	C	GSE Subtotal	903,924.79	902,254.79
164	C	FY 1963 Total	3,491,700.22	3,482,479.22
167	C	Phase III, Sup. Act. FY 1954	7,412,083.42	7,411,603.42
167	C	Wallops Suballotment FY 1965	85,000.00	84,520.00
167	C	Totals, FY 1965	7,495,006.42	7,494,526.42
167	C	Total	23,894,745.96	23,894,265.96
168	A	Vehicles, 60.400.898, NAS1-6020-31-J	0	700.00
168	C	Hardware Subtotal	116,413.00	117,113.00
170	A	20.200.321, NAS1-2455	0	-700.00
170	A	20.200.448, NAS1-1928-1-6	0	-1,099.00
170	C	20.200.284, NAS1-1928-11	18,230.00	4,674.00
170	C	20.200.381, NAS1-1928-13	2,803.00	2,446.00
170	C	20.200.336, NAS1-2455-11	700.00	670.00
170	C	Wallops Subtotal	251,531.43	235,789.43
171	C	20.200.296, NAS1-2215-2	3,688.00	453.00
171	C	Western Test Range Subtotal	29,321.52	26,086.52
172	C	20.200.226, NAS1-1928-3-1	3,576.25	3,066.00
172	C	20.200.382, NAS1-1928-5-1	2,217.00	1,581.00
172	C	20.200.445, NAS1-1928-8-2	651.00	0
172	C	20.200.449, NAS1-1928-14	26,724.00	25,946.00
172	C	20.200.586, NAS1-1928-16	50,000.00	36,865.00
172	C	20.200.207, NAS1-2189-6(c2)	7,500.00	0
172	C	20.200.307, NAS1-2189-6(c2)	9,332.00	0
172	C	20.200.545, NAS1-2189-9(c5)	16,585.00	289.00

PAGE NO.	TYPE OF REVISION	REFERENCE INFORMATION	PUBLISHED	CORRECT DESIGNATION
173	A	60.400.931, NAS1-10000-G	$ 0	$ 30.00
173	A	60.400.931, NAS1-10000-E	0	65,986.25
173	A	60.400.931, NAS1-10000-R-26	0	1,099.00
173	A	60.400.506, NAS1-4664-25	0	1,736.00
173	A	60.400.621, NAS1-5610-2	0	118,709.13
173	A	60.400.443, NAS1-5610	0	1,108,354.68
173	A	20.200.420, NAS1-3420-3(c6)	0	-1,736.00
173	C	Production Support Subtotal	2,998,233.65	3,016,510.65
173	C	Supporting Activities Subtotal	3,283,587.00	3,282,890.00
173	C	FY 1964 Total	3,400,000.00	4,099,303.00
173	C	60.400.343, NAS1-3899-36	3,000.00	2,887.00
173	C	Mission Mods Subtotal	9,363.00	9,250.00
173	C	Hardware Subtotal	9,363.00	1,236,313.81
175	C	60.400.133, NAS1-3899-12	8,309.00	3,891.00
176	C	Suballotment, Wallops	85,000.00	84,520.00
176	C	Wallops Station Subtotal	191,545.63	186,647.63
176	C	60.400.320, NAS1-3899-33	182,500.00	182,181.00
176	C	60.400.074, NAS1-4325	122,350.00	97,272.00
176	C	Western Test Range Subtotal	878,716.21	853,319.21
177	A	20.200.448, NAS1-1928-1-6	0	-6,363.00
177	C	P00806, NAS1-1928-2	27,918.00	27,749.00
177	T	60.400.184	NAS1-3489-10	NAS1-3589-10
177	C	20.200.553, NAS1-3899-8	4,000.00	2,989.00
177	C	60.400.106, NAS1-3899-9	43,667.00	42,148.00
177	C	20.200.516, NAS1-3899-15	31,010.00	29,154.00
177	C	60.400.157, NAS1-3899-21	34,204.00	33,328.00
178	A	60.400.443, NAS1-5610	0	877,404.00
178	A	60.400.443, NAS1-5610	0	490,332.00
178	A	60.400.443, NAS1-5610	0	212,360.00
178	A	60.400.931, NAS1-10000-R-26	0	6,363.00
178	A	60.400.931, NAS1-10000-E	0	38,986.00
178	C	60.400.252, NAS1-3899-29	9,000.00	5,204.00
178	C	60.400.199, NAS1-4664	4,219,135.28	1,411,975.47
178	A	60.400.931, NAS1-10000-A	0	169.00
178	C	Production Support Subtotal	6,292,591.67	5,095,455.86
178	C	Supporting Activities Subtotal	7,412,083.42	6,184,652.61
178	C	FY 1965 Total	7,495,006.42	7,494,526.42
188	T	Hardware Subtotal	1,169,386.93	843,761.02
190	C	20.200.085, NAS1-2165-4(c3)	10,154.00	311.00
190	C	Spares Subtotal	132,221.78	122,378.78
190	C	Phase III Subtotal	5,303,493.73	5,293,650.73
192	C	P26-051, NAS1-2165	21,000.00	4,907.00
192	C	Spares Subtotal	21,092.96	4,999.96
192	C	Hardware Subtotal	84,598.36	68,505.36
192	C	P23-064, NAS1-2189	600,000.00	527,289.00
192	C	Wallops Station Subtotal	600,000.00	527,289.00
192	C	Supporting Activities Subtotal	606,995.82	534,284.82

PAGE NO.	TYPE OF REVISION	REFERENCE INFORMATION	PUBLISHED	CORRECT DESIGNATION
193	C	Phase II Subtotal	$ 705,321.18	$ 616,517.18
196	C	20.200.449, NAS1-1928-14	24,475.00	24,237.00
196	C	Vehicles Subtotal	121,338.00	121,100.00
196	C	Hardware Subtotal	121,488.00	121,250.00
196	C	Phase II Subtotal	122,386.07	122,148.07
198	C	20.200.392, NAS1-1928-6-2	27,109.00	16,607.00
198	C	Mission Mods Subtotal	39,837.00	29,335.00
198	C	Hardware Subtotal	5,373,630.84	5,363,128.84
199	C	20.200.383. NAS1-2189-7(c3)	29,015.00	0
199	C	Wallops Station Subtotal	1,728,902.80	1,699,887.80
199	C	Supporting Activities Subtotal	1,728,902.80	1,699,887.80
199	C	Phase III Subtotal	7,102,533.64	7,063,016.64
201	C	60.400.326, NAS1-3899-31	18,674.00	16,360.00
201	C	Vehicles Subtotal	1,299,049.00	1,296,735.00
202	C	Hardware Subtotal	1,565,281.89	1,562,967.89
203	C	Phase III Subtotal	1,647,911.75	1,645,597.75
226	C	Phase IV Planned	4,606,771.10	4,604,901.38
227	C	P2Y-010, NAS1-1481	339,500.00	327,977.61
227	C	WTR Ground Support Equipment Subt.	645,809.66	634,287.27
227	C	(62-6) FY 1962 Total	7,262,382.00	7,248,989.89
232	C	P21-013, NAS1-1481-6(c2)	15,000.00	6,410.39
232	C	WTR GSE Subtotal	84,387.90	75,798.29
232	C	(62-6) FY 1963 Total	893,019.08	884,429.47
233	C	20.200.077, NAS1-2165-4(c2)	18,633.00	4,879.00
233	C	Spares Subtotal	33,334.00	19,580.00
233	C	Phase III Subtotal	119,440.20	105,686.20
233	C	(62-6) FY 1964 Total	260,281.00	246,527.00
234	C	Phase IV Planned	1,055,281.05	1,048,614.05
234	C	(62-6) FY 1965 Total	1,268,749.54	1,262,082.54
238	C	Phase V Planned	486.44	2,532.44
238	C	(63-29) FY 1963 Total	3,451,574.75	3,453,620.75
240	C	20.200.129, NAS1-2165-8	3,182.00	0
240	C	Phase III Subtotal	248,377.24	245,195.24
240	C	Phase IV Planned	1,000,810.26	998,897.26
240	C	(63-29) FY 1965 Planned	1,254,549.00	1,249,454.00
254	C	NAS1-553	2,249,574.00	2,249,555.00
255	C	L-3920(G)	2,529.257.00	2,531,412.00
255	C	NAS1-1928	2,240,912.00	2,242,670.00
255	C	NAS1-1970	604,522.00	605,041.00
255	C	NAS1-2650	9,155,605.00	9,190,359.00
256	C	NAS1-3589	4,644,232.00	4,690,722.00
256	C	NAS1-3493	1,821,156.00	1,824,865.00
256	C	NAS1-3615	1,830,770.00	1,831,644.00
256	C	NAS1-3657	4,812,066.00	4,850,331.00
256	C	NAS1-3899	1,638,094.00	1,661,391.00
256	T	NAS1-3420	1,089,853.00	1,089,153.00

PAGE NO.	TYPE OF REVISION	REFERENCE INFORMATION	PUBLISHED	CORRECT DESIGNATION
262	A	L-3920, A-16	$ 0	$ 2,155.03
262	C	Total Funded	2,529,257.00	2,531,412.00
281	A	Task 12, A-2	0	186.00
281	C	Task 12 Total	12,903.00	13,089.00
281	A	Task 15, A-1	0	733.00
281	C	Task 15 Total	1,553.00	2,286.00
281	A	Task 17, A-2	0	839.00
281	C	Task 17 Total	12,276.00	3,115.00
281	C	Total Funded	2,240,912.00	2,242,670.00
282	A	NAS1-1970, M-9	0	288.00
282	A	NAS1-1970, M-10	0	231.00
282	C	Total Contract	604,522.00	605,041.00
286	A	NAS1-2650, M-13	0	34,754.00
286	C	Total Contract	9,155,605.00	9,190,359.00
289	T	NAS1-3420, Total Funded	1,089,853.00	1,089,153.00
291	A	NAS1-3493m A-10	0	3,709.00
291	C	Total Contract	1,821,156.00	1,824,865.00
291	C	Total Funded	1,821,156.00	1,824,865.00
294	A	NAS1-3589, M-22	0	13,778.00
294	A	NAS1-3589, M-23	0	32,712.00
294	C	Total Funded	4,644,232.00	4,690,722.00
295	A	NAS1-3615, M-5	0	761.00
295	A	NAS1-3615, M-6	0	113.00
295	C	Total Funded	1,830,770.00	1,831,644.00
296	A	NAS1-3657, A-8	0	27,090.00
296	A	NAS1-3657, A-9	0	11,175.00
296	C	Total Funded	4,812,066.00	4,850,331.00
309	A	NAS1-3899, Task 16, A-1	0	70.00
309	C	NAS1-3899, Task 16 Total	5,207.00	5,277.00
309	A	NAS1-3899, Task 17, A-4	0	298.00
309	A	NAS1-3899, Task 17, A-5	0	155.00
309	A	NAS1-3899, Task 17, A-6	0	206.00
309	C	NAS1-3899, Task 17 Total	87,467.00	88,126.00
310	A	NAS1-3899, Task 22	0	7,203.00
310	A	NAS1-3899, Task 23	0	2,831.00
310	A	NAS1-3899, Task 26	0	9,150.00
311	A	NAS1-3899, Task 34, A-3	0	596.00
311	A	NAS1-3899, Task 34, A-4	0	188.00
311	C	NAS1-3899, Task 34 Total	51,312.00	52,096.00
312	A	NAS1-3899, Task 38, M-3	0	964.00
312	A	NAS1-3899, Task 38, M-4	0	384.00
312	C	NAS1-3899, Task 38 Total	130,153.00	131,501.00
313	A	NAS1-3899, Task 41, M-3	0	0
313	A	NAS1-3899, Task 41, M-4	0	741.00
313	C	NAS1-3899, Task 41 Total	130,190.00	130,931.00
313	A	NAS1-3899, Task 43,M-3	0	432.00
313	C	NAS1-3899, Task 43 Total	98,071.00	98,503.00
313	A	NAS1-3899, Task 44, M-2	0	79.00
313	C	NAS1-3899, Task 44 Total	20,934.00	21,013.00
313	C	NAS1-3899 Total Contract	1,638,094.00	1,661,391.00
313	C	NAS1-3899, Total Funded	1,638,094.00	1,661,391.00